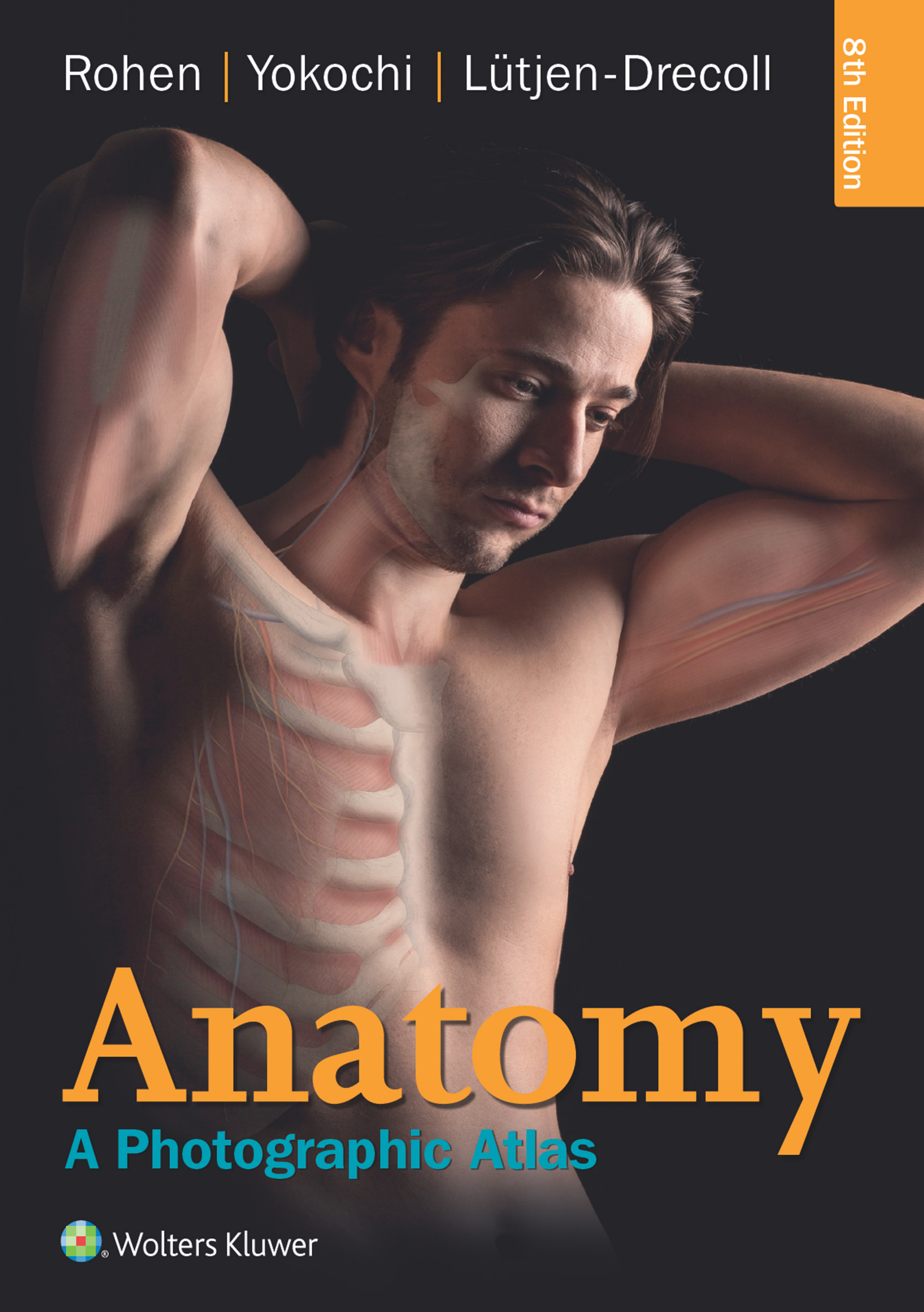


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8th edition

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Preface to the Eighth Edition

The knowledge of the structure and topography of the various organs of the human body is a prerequisite not only for the education of medical students but also for everyone involved in diagnostic and therapy of human diseases. This knowledge can optimally be gained by dissection of the human body, with an excellent atlas by one's side. Today there exist a number of good anatomic atlases, but most of them contain mainly schematic drawings, which minimally reflect reality. In contrast, the photographs of the actual anatomic specimens have the advantage of conveying the reality of the object with its proportions and spatial dimensions in a more accurate manner.

On the other hand, schematic drawings help us to better understand the photos. Therefore, in this eighth edition, the number of drawings has greatly been increased and old drawings have been replaced by new ones specifically adapted to their accompanying photos.

The didactic purpose of this atlas is not only to help the student understand the topography of the human body. We also hope to provide a way to systematically learn the anatomical structures and functions. Therefore, the chapters of regional anatomy are consequently placed behind a systematic description of the anatomical structures – e.g., before dissecting an extremity, the

student can study the systematic anatomy of the involved bones, joints, muscles, nerves, and vessels.

The correlations between clinical images like MRI and CT scans can best be learned if sections of scans can be directly compared with cadaveric anatomical sections of the same region. In this edition, a number of MRI scans have been added that have been taken in a plane of the related anatomical section. In addition, functional MRI scans of the heart and the related anatomical preparations are included, hopefully increasing the importance of the atlas for clinical purposes.

While preparing this new edition, the authors were reminded of how precisely, beautifully, and admirably the human body is constructed. If this book helps the student or physician to appreciate the overwhelming beauty of the anatomical architecture of these tissues and organs, then it greatly fulfills its task. Deep interest and admiration of these anatomical structures may create the "love for the human being," which unhesitatingly becomes the inspiration to pursue the vocation of medicine.

Erlangen, Germany; Spring 2015

J. W. Rohen
C. Yokochi
E. Lütjen-Drecoll

The preparations of the anatomical specimens shown in this atlas were time consuming and required profound knowledge. Therefore, all were prepared by anatomists or surgeons. The majority were prepared by the authors and coworkers either in the Department of Anatomy in Erlangen or in the Department of Anatomy, Kanagawa, Dental College in Tokyo. We would like to express our great gratitude to Prof. S. Nagashima, Prof. K. Okamoto, and Dr. M. Takahashi (all Japan) who worked for extended periods in Germany in the Department of Anatomy in Erlangen, and to Dr. K. Schmidt, Dr. G. Lindner-Funk (both Nuremberg), Dr. M. Rexer (Fürth), R.M. Mc Donnell (Dallas, USA), and Mr. J. Bryant (Erlangen) for dissecting specimens with great skill and knowledge.

We are also greatly indebted to Mr. H. Sommer (SOMSO Co., Coburg, Germany) who kindly provided a number of excellent bone specimens.

All the excellent macro photos of specimens newly included in this eighth edition, most notably those of the skeletal system and of the heart, were contributed by our photographer Mr. M. Gößwein, to whom we express our great gratitude.

Most important for this new eighth edition was the work of our artist Mr. J. Pekarsky. He created many new drawings specifi-

cally adapted to the photos in this edition and revised most of the old ones. We express our many thanks to him for his most excellent and time consuming work.

We are greatly indebted to our coworkers from the Department of Radiology, especially Prof. M. Uder and his colleagues (Erlangen) who took the time to perform MRI scans specifically adapted to specimens in our atlas and who added scans to the heart chapter that significantly improved our ability to elucidate the functional aspects of this organ. Also, we extend our thanks to Prof. W. J. Huk and Prof. W. Bautz (both Erlangen), Prof. A. Heuck (Munich), and Dr. Wieners (Berlin) for their excellent MRI and CT scans.

In addition, we express our many thanks to our secretary Mrs. L. Koehler for her untiring and excellent cooperation and to Dr. C. Sims-O'Neil for her careful corrections of the proofs of the new edition.

Finally, we gratefully acknowledge the head of our publisher (Schattauer Verlag, Stuttgart) Mr. D. Bergemann and his coworkers, particularly Mrs. E. Wallstein, who prepared the final layout of the Atlas and worked intensely together with the authors on the new structure of this edition.

Acknowledgments

Preface to the First Edition

Today there exist any number of good anatomic atlases. Consequently, the advent of a new work requires justification. We found three main reasons to undertake the publication of such a book.

First of all, most of the previous atlases contain mainly schematic or semischematic drawings, which often reflect reality only in a limited way; the third dimension, i.e., the spatial effect, is lacking. In contrast, the photo of the actual anatomic specimen has the advantage of conveying the reality of the object with its proportions and spatial dimensions in a more exact and realistic manner than the "idealized," colored "nice" drawings of most previous atlases. Furthermore, the photo of the human specimen corresponds to the student's observations and needs in the dissection courses. Thus he has the advantage of immediate orientation by photographic specimens while working with the cadaver.

Secondly, some of the existing atlases are classified by systemic rather than regional aspects. As a result, the student needs several books each supplying the necessary facts for a certain region of the body. The present atlas, however, tries to portray macroscopic anatomy with regard to the regional and stratigraphic aspects of the object itself as realistically as possible. Hence it is an immediate help during the dissection courses in the study of medical and dental anatomy.

Another intention of the authors was to limit the subject to the essential and to offer it didactically in a way that is self-explanatory. To all regions of the body we added schematic drawings of the main tributaries of nerves and vessels, of the course and mechanism of the muscles, of the nomenclature of the various regions, etc. This will enhance the understanding of the details

seen in the photographs. The complicated architecture of the skull bones, for example, was not presented in a descriptive way, but rather through a series of figures revealing the mosaic of bones by adding one bone to another, so that ultimately the composition of skull bones can be more easily understood.

Finally, the authors also considered the present situation in medical education. On one hand there is a universal lack of cadavers in many departments of anatomy, while on the other hand there has been a considerable increase in the number of students almost everywhere. As a consequence, students do not have access to sufficient illustrative material for their anatomic studies. Of course, photos can never replace the immediate observation, but we think the use of a macroscopic photo instead of a painted, mostly idealized picture is more appropriate and is an improvement in anatomic study over drawings alone.

The majority of the specimens depicted in the atlas were prepared by the authors either in the Dept. of Anatomy in Erlangen, Germany, or in the Dept. of Anatomy, Kanagawa Dental College, Yokosuka, Japan. The specimens of the chapter on the neck and those of the spinal cord demonstrating the dorsal branches of the spinal nerves were prepared by Dr. K. Schmidt with great skill and enthusiasm. The specimens of the ligaments of the vertebral column were prepared by Dr. Th. Mokrusch, and a great number of specimens in the chapter of the upper and lower limb was very carefully prepared by Dr. S. Nagashima, Kurume, Japan.

Once again, our warmest thanks go out to all of our coworkers for their unselfish, devoted and highly qualified work.

Erlangen, Germany; Spring 1983

J. W. Rohen
C. Yokochi

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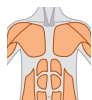
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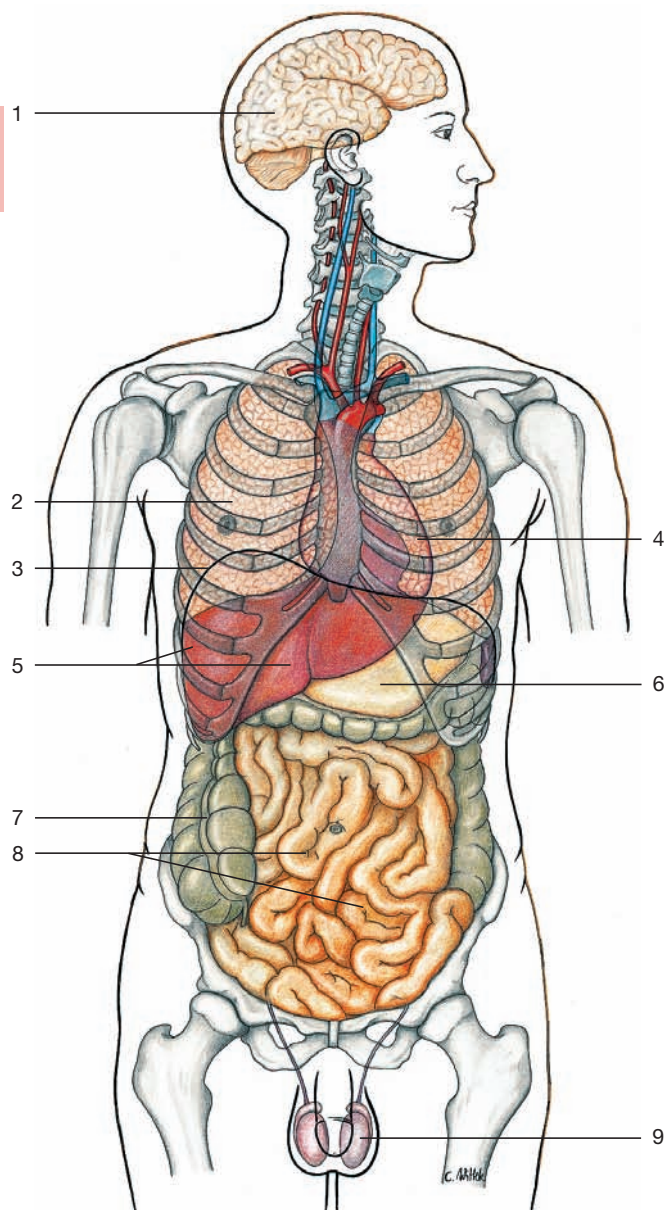
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1 General Anatomy

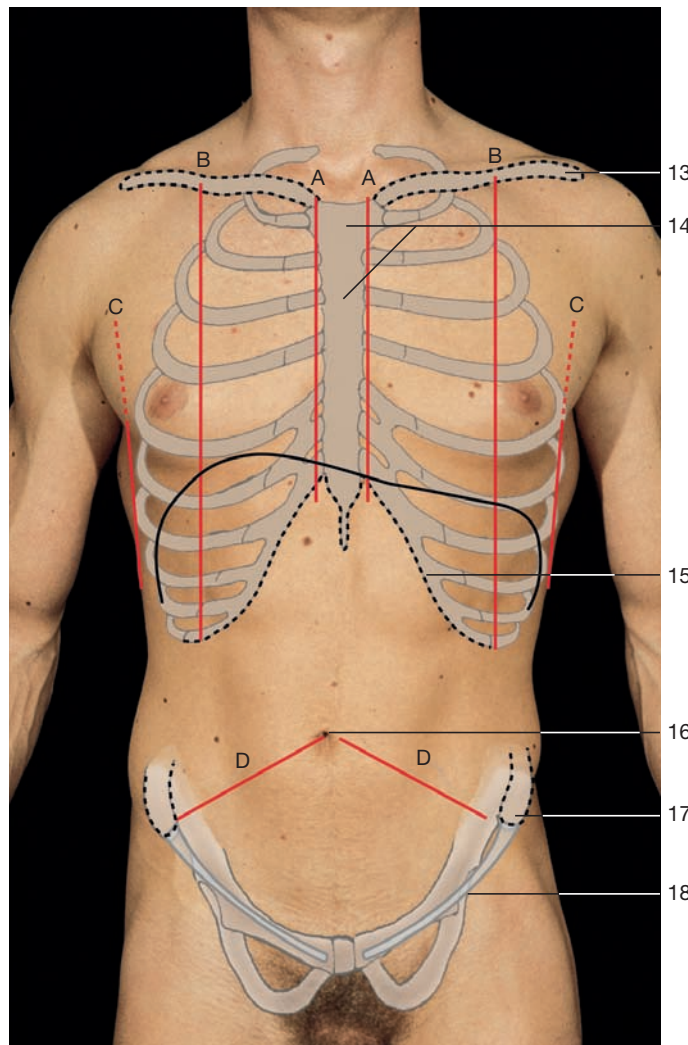


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Position of the inner organs of the human body (anterior aspect).
The main cavities of the body and their contents.



Regional lines and palpable points at the ventral side of the human body.

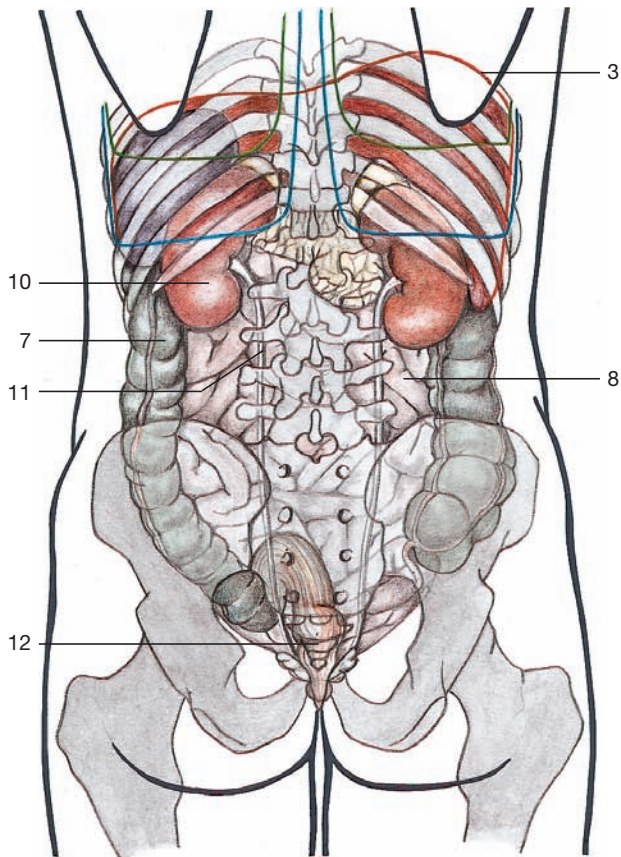
Regional lines

- A = Parasternal line
- B = Midclavicular line
- C = Anterior axillary line
- D = Umbilical-pelvic line

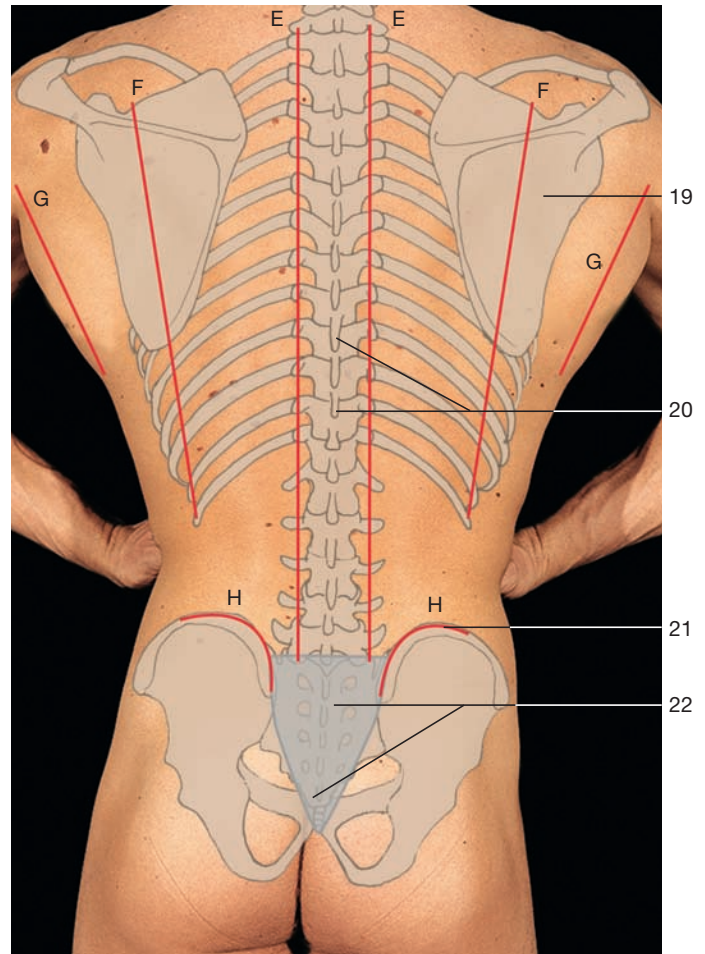
The bones of the skeletal system are palpable through the skin at different points. This enables physicians to localize the inner organs. On the **ventral side**, the clavicle, sternum, ribs, and intercostal spaces are palpable. Furthermore, the anterior iliac spine and the symphysis can be

localized. For better orientation, several **lines of orientation** are used, e.g., the parasternal line, the midclavicular line, the anterior axillary line, the umbilical-pelvic line.

By means of these lines, the heart and the position of the vermiform process can be localized.



Position of the inner organs of the human body (posterior aspect).



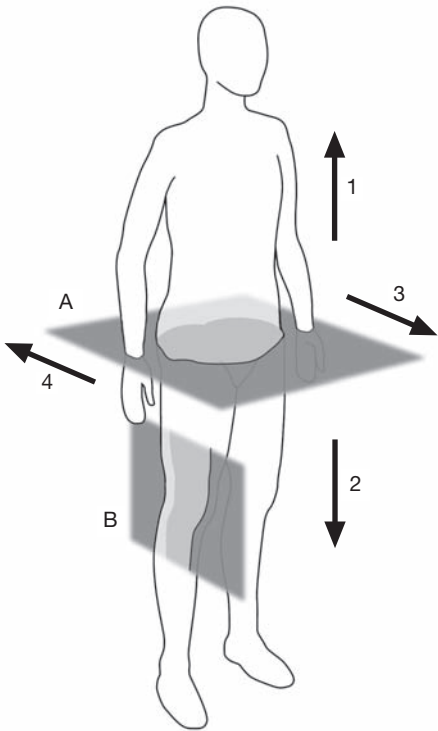
Regional lines and palpable points at the dorsal side of the human body.

Regional lines

- E = Paravertebral line
- F = Scapular line
- G = Posterior axillary line
- H = Iliac crest

- 1 Brain
- 2 Lung
- 3 Diaphragm
- 4 Heart
- 5 Liver
- 6 Stomach
- 7 Colon
- 8 Small intestine
- 9 Testis
- 10 Kidney
- 11 Ureter
- 12 Anal canal
- 13 Clavicle
- 14 Manubrium sterni
- 15 Costal arch
- 16 Umbilicus
- 17 Anterior superior iliac spine
- 18 Inguinal ligament
- 19 Scapular spine
- 20 Spinous processes
- 21 Iliac crest
- 22 Coccyx and sacrum

At the **dorsal side** of the body, the posterior spines of the vertebral column, the ribs, the scapula, the sacrum, and the iliac crest are palpable. **Lines of orientation** are the paravertebral line, the scapular line, the posterior axillary line, and the iliac crest.

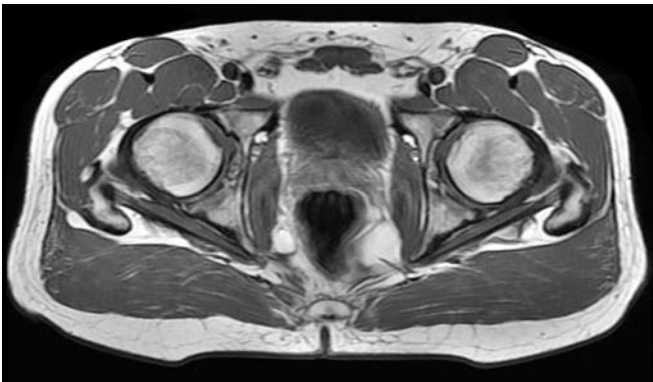


Planes of the body:
A = Horizontal or axial or transverse plane
B = Sagittal plane (at the level of the knee joint)

Directions:
1 = Cranial 3 = Anterior (ventral)
2 = Caudal 4 = Posterior (dorsal)



Horizontal section through the pelvic cavity and the hip joints.



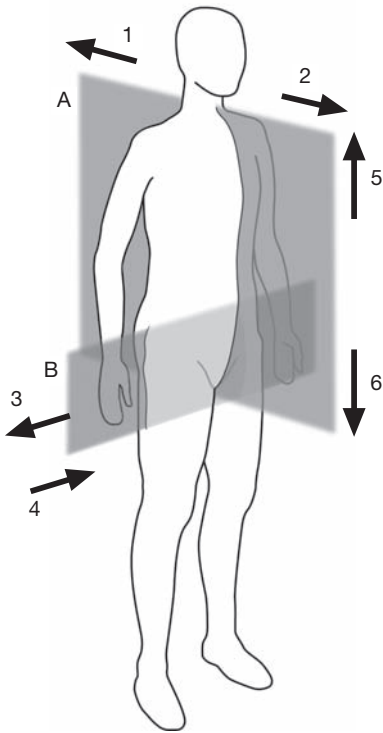
MRI scan through the pelvic cavity and the hip joints (horizontal or axial or transverse plane).



Sagittal section through the knee joint.



MRI scan through the knee joint (sagittal plane).

**Planes of the body:**

A = Midsagittal or median plane

B = Frontal or coronal plane (through the pelvic cavity)

Directions:

1 = Posterior (dorsal)

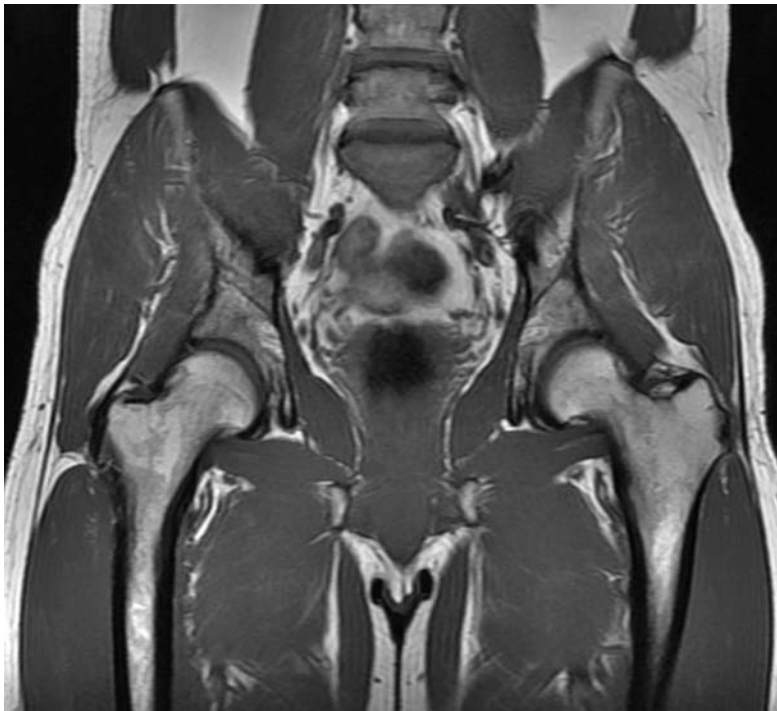
4 = Medial

2 = Anterior (ventral)

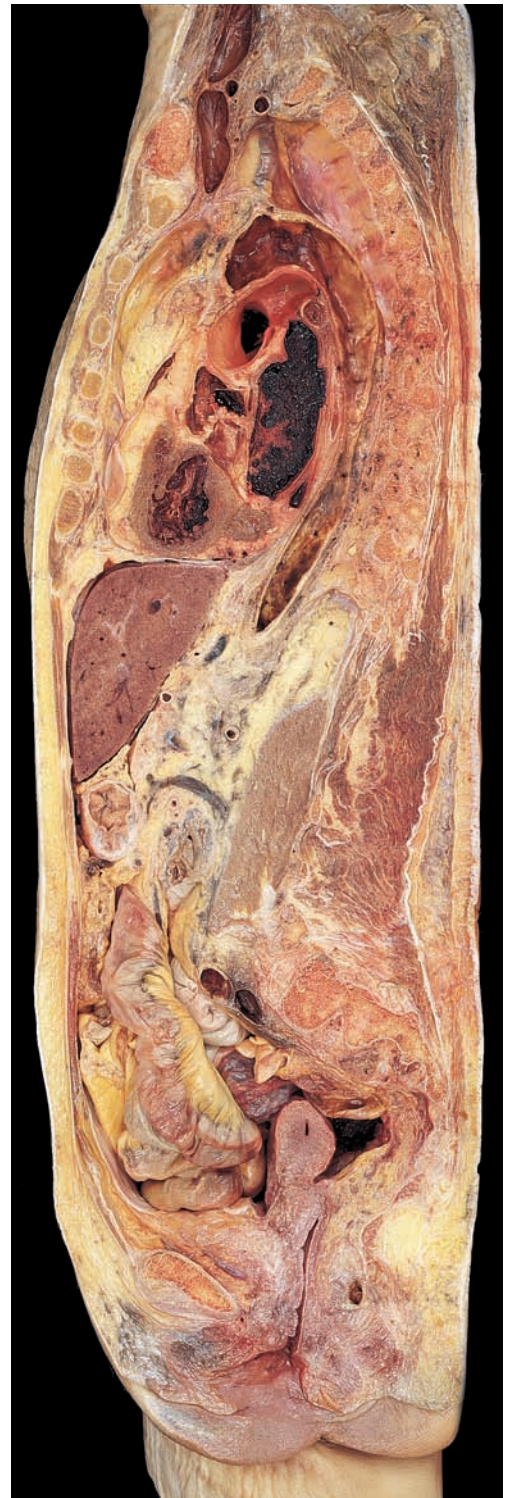
5 = Cranial

3 = Lateral

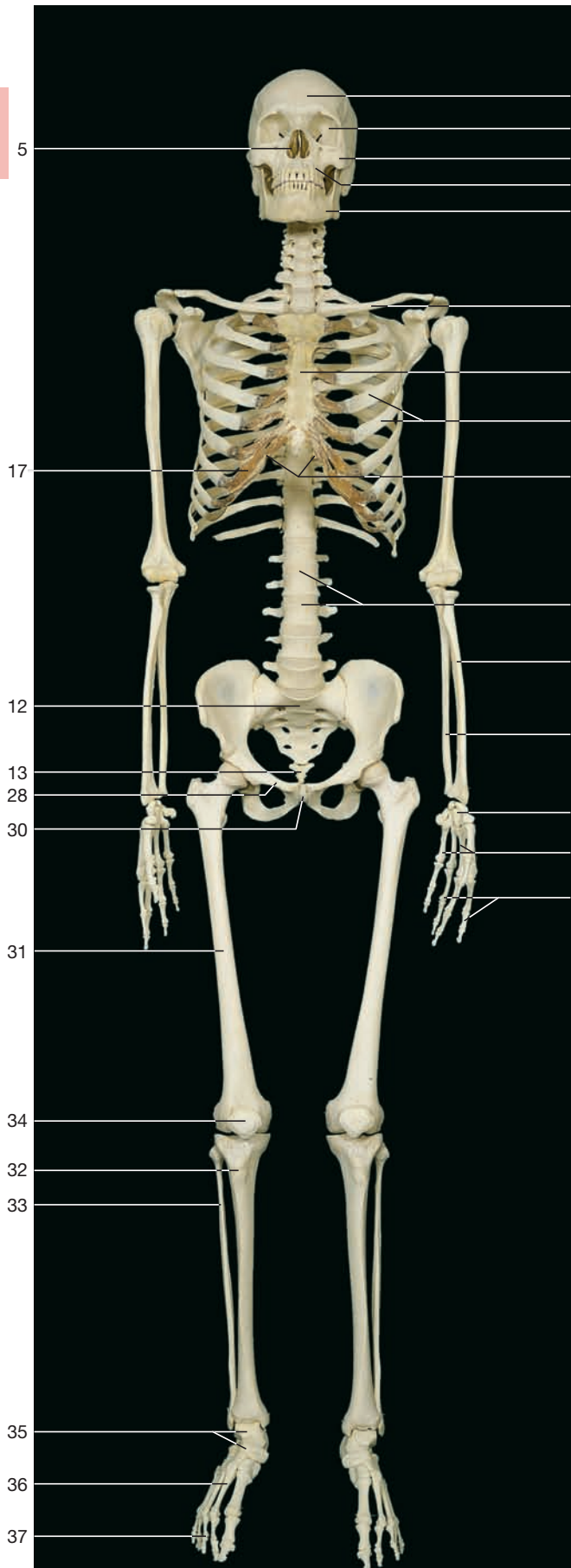
6 = Caudal



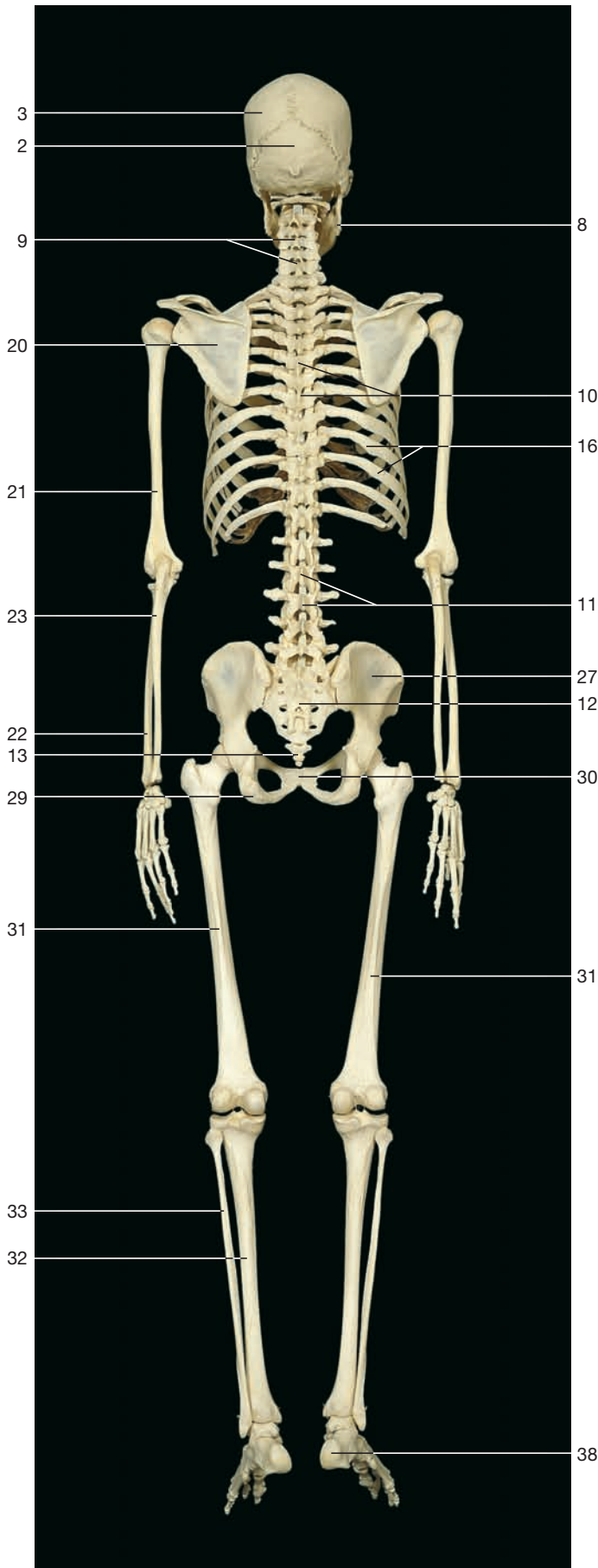
MRI scan through the pelvic cavity and the hip joints (frontal or coronal plane).



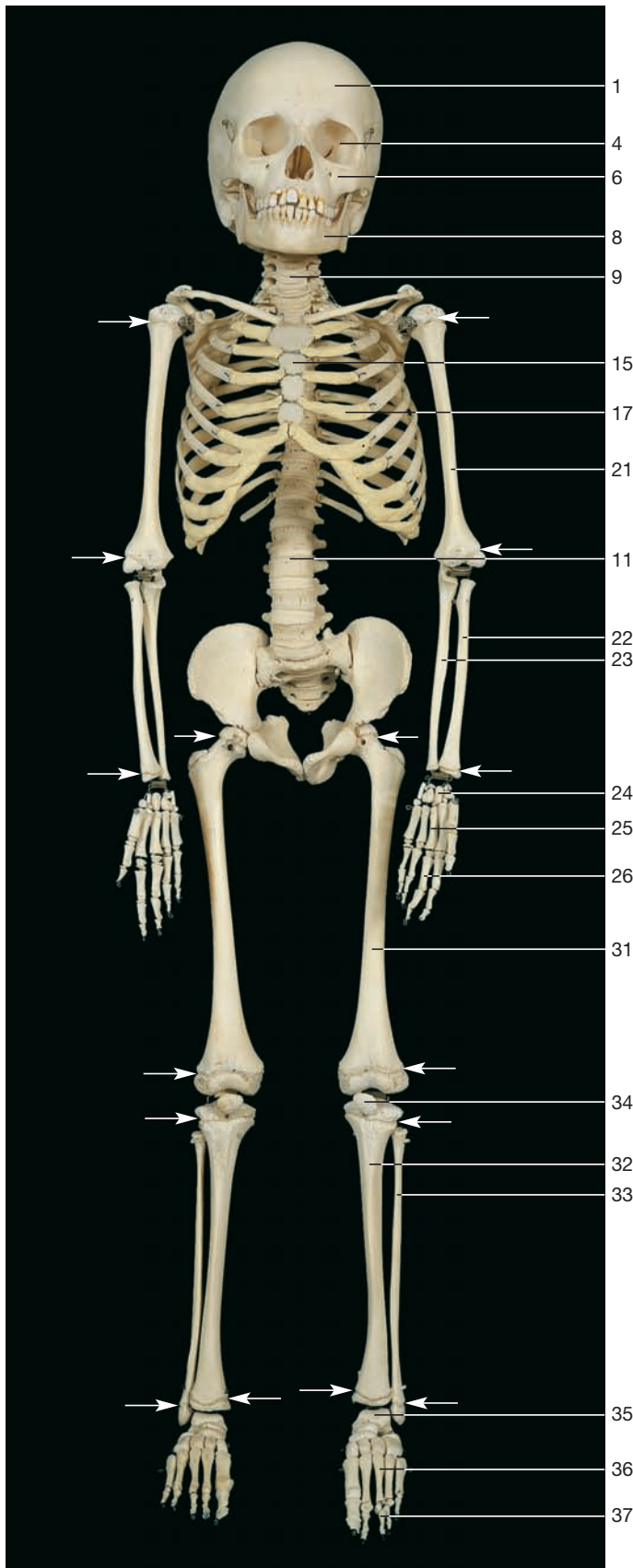
Median section through the trunk of a female.



Skeleton of a female adult (anterior aspect).



Skeleton of a female adult (posterior aspect).



Axial skeleton

Head

- 1 Frontal bone
- 2 Occipital bone
- 3 Parietal bone
- 4 Orbit
- 5 Nasal cavity
- 6 Maxilla
- 7 Zygomatic bone
- 8 Mandible

Trunk and thorax

Vertebral column

- 9 Cervical vertebrae
- 10 Thoracic vertebrae
- 11 Lumbar vertebrae
- 12 Sacrum
- 13 Coccyx
- 14 Intervertebral discs

Thorax

- 15 Sternum
- 16 Ribs
- 17 Costal cartilage
- 18 Infrasternal angle

Appendicular skeleton

Upper limb and shoulder girdle

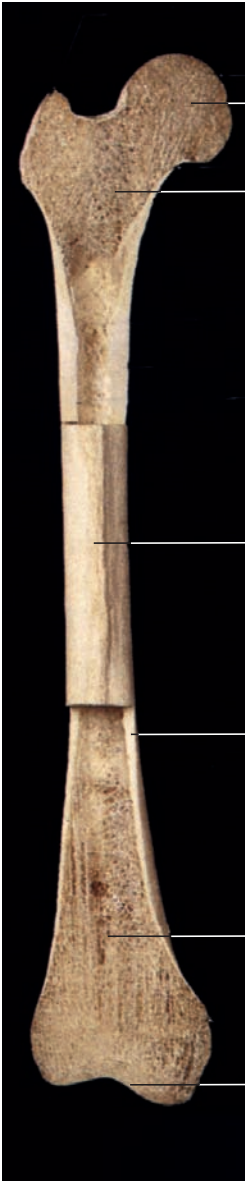
- 19 Clavicle
- 20 Scapula
- 21 Humerus
- 22 Radius
- 23 Ulna
- 24 Carpal bones
- 25 Metacarpal bones
- 26 Phalanges of the hand

Lower limb and pelvis

- 27 Ilium
- 28 Pubis
- 29 Ischium
- 30 Symphysis pubis
- 31 Femur
- 32 Tibia
- 33 Fibula
- 34 Patella
- 35 Tarsal bones
- 36 Metatarsal bones
- 37 Phalanges of the foot
- 38 Calcaneus

Skeleton of a 5-year-old child (anterior aspect).

The zones of the cartilaginous growth plates are seen (arrows). In contrast to the adult, the ribs show a predominantly horizontal position.



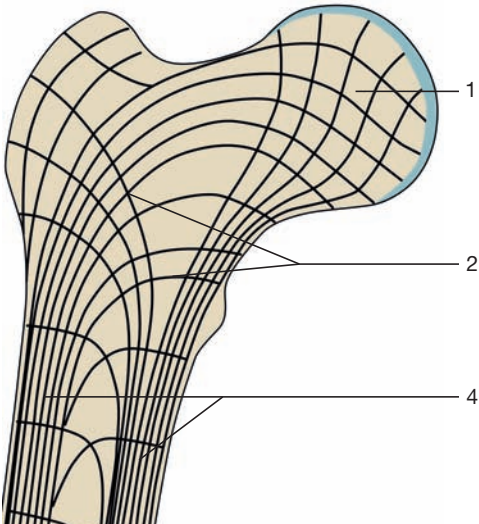
MRI scan of the right femur and hip joint (coronal section). (From Heuck et al., MRT-Atlas, 2009.)



X-ray of the right femur and hip joint (a.-p. direction).

- 1 Head of the femur
- 2 Spongy bone
- 3 Diaphysis of the femur
- 4 Compact bone
- 5 Articular cartilage

◁ **Femur of the adult.** Coronal section of the proximal and distal epiphyses displaying the spongy bone and the medullary cavity.



Three-dimensional representation on the trajectorial lines of the femoral head.



Coronal section through the proximal end of the adult femur showing the characteristic structure of the spongy bone.

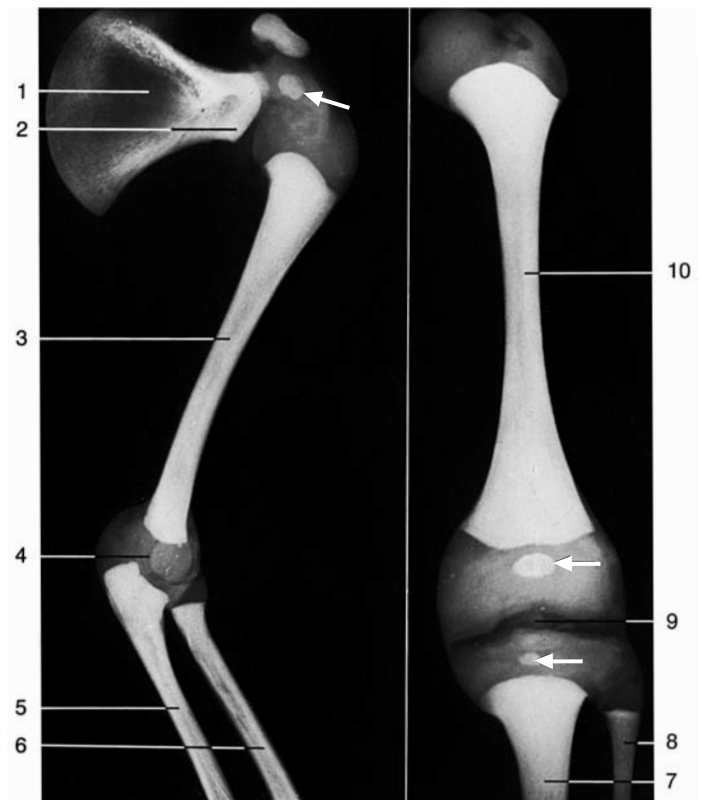


The **ossification of the bones** of the limbs starts within the ossification centers of the primary cartilagenous bones. Here, the medullary cavity develops. The ossification process of limb bones is not finished at birth.



Ossification of the femur (left: coronal section, right: posterior aspect of the femur). Arrows: distal epiphysis.

- | | |
|--|-----------------------|
| ◁ 1 Ossification center in the head of the femur | 5 Lateral condyle |
| 2 Greater trochanter | 6 Medial condyle |
| 3 Head of the femur | 7 Intercondylar notch |
| 4 Neck of the femur | 8 Diaphysis |

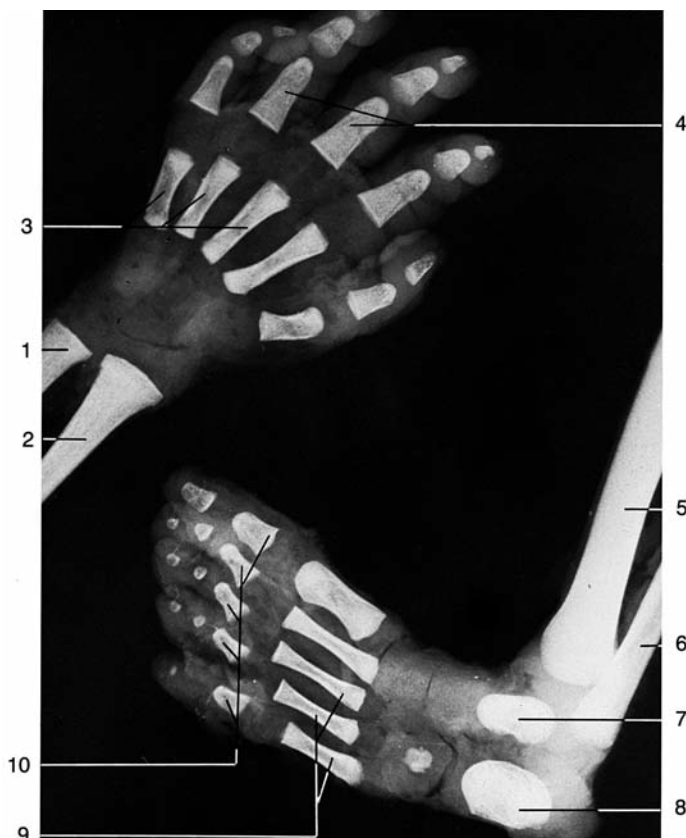


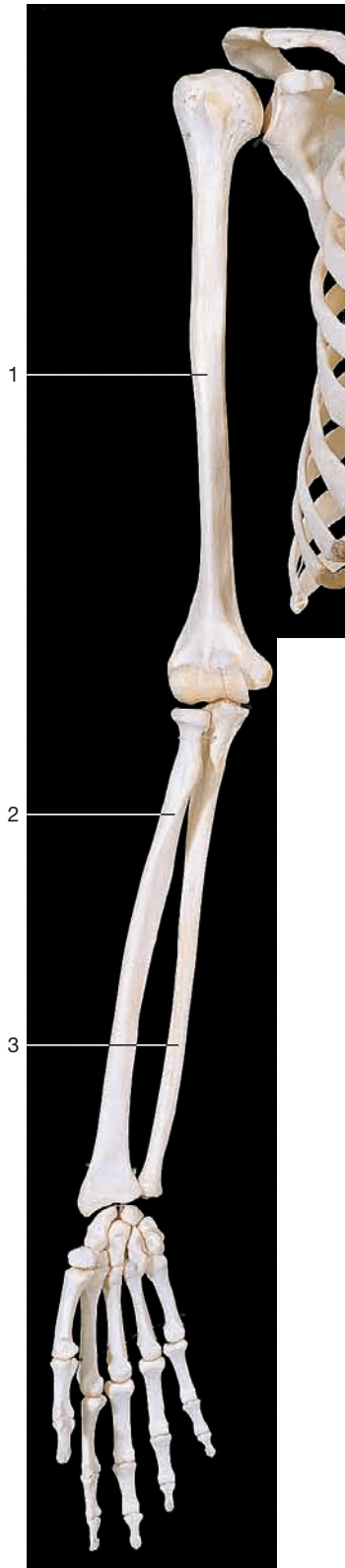
X-ray of the upper and lower limb of a newborn child (left: upper limb, right: lower limb). Arrows: ossification centers.

- | | |
|------------------|--------------|
| 1 Scapula | 6 Radius |
| 2 Shoulder joint | 7 Tibia |
| 3 Humerus | 8 Fibula |
| 4 Elbow joint | 9 Knee joint |
| 5 Ulna | 10 Femur |

- | | |
|--------------------|--------------------|
| ◁ 1 Ulna | 6 Fibula |
| 2 Radius | 7 Talus |
| 3 Metacarpal bones | 8 Calcaneus |
| 4 Phalanges | 9 Metatarsal bones |
| 5 Tibia | 10 Phalanges |

X-ray of hand and foot of a newborn.

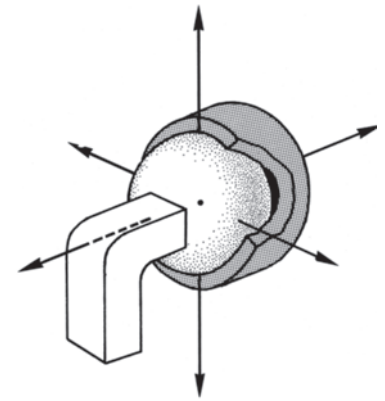




Skeleton of the arm and shoulder girdle (anterior aspect).

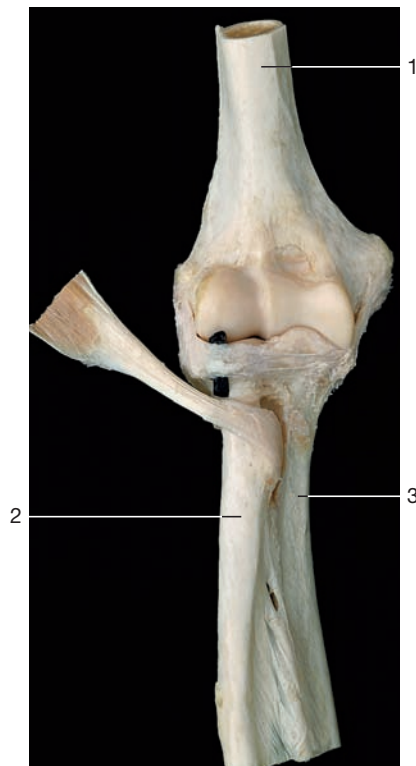


Shoulder joint as an example of a multiaxial ball-and-socket joint (coronal section).



Ball-and-socket joint with its different axes. Arrows: axes of movement.

- 1 Humerus
- 2 Radius
- 3 Ulna
- 4 Articular cavity (shoulder joint)
- 5 Metacarpophalangeal joint
- 6 Joints of fingers



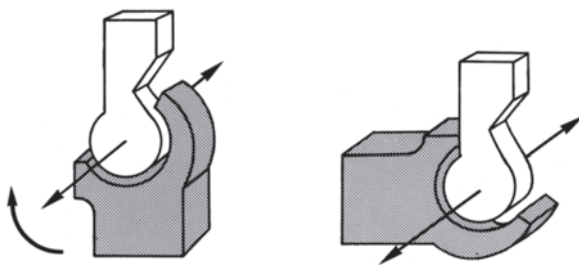
Elbow joint with ligaments as an example of a hinge joint (monaxial humero-ulnar joint) in combination with a pivot joint (monaxial radio-ulnar joint), which allows rotation.



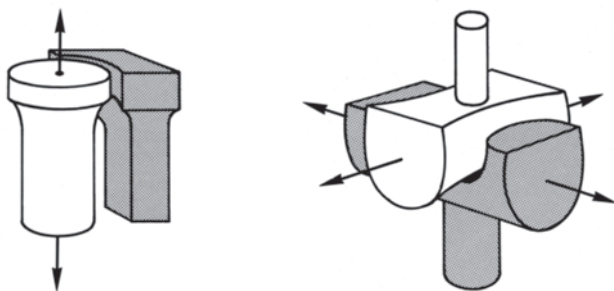
Coronal section through the elbow joint (MRI scan). (Courtesy of Prof. Heuck, Munich, Germany.) The possibilities of movement are shown in the schematic drawings on page 11.



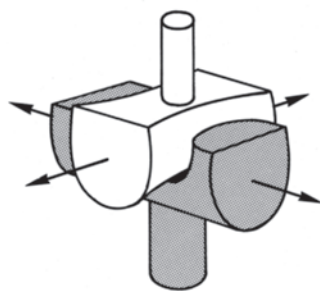
Coronal section through the shoulder joint (MRI scan).
(From Heuck et al., MRT-Atlas, 2009.)



Hinge joint
(e.g., humero-ulnar joint). Left: extension, right: flexion.
Arrows: axes of movement.



Pivot joint
(e.g., radio-ulnar joint).

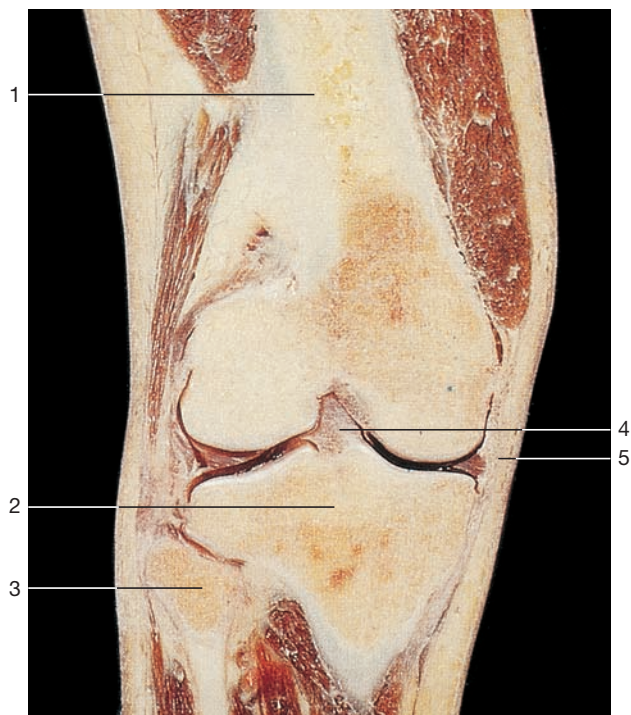


Saddle joint
(e.g., carpometacarpal joint of the thumb).

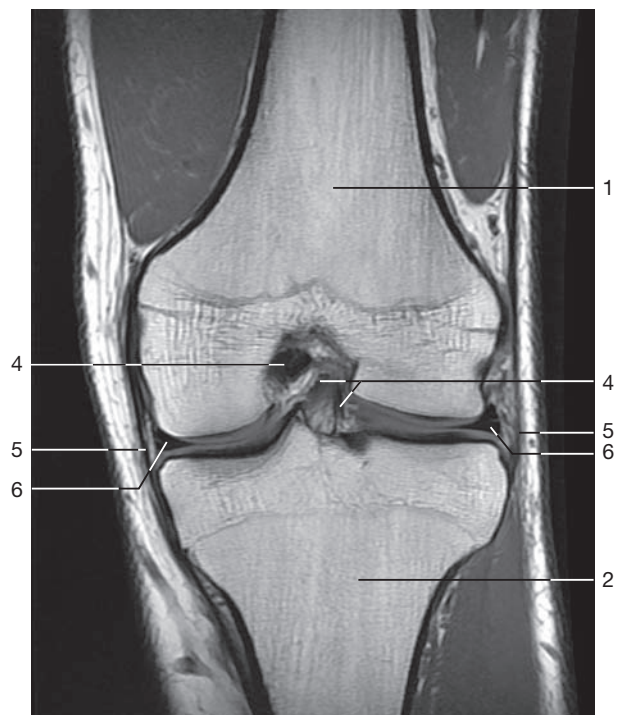


Skeleton of right wrist and hand (medial aspect).
The metacarpophalangeal joints are biaxial, as is the carpometacarpal joint of the thumb (* in the figure). The joints of the fingers, however, are monaxial.

Joints exhibit a variety of functions. In general, mobility becomes reduced in the direction from proximal to distal. The hip joint, e.g., is multiaxial; the knee joint is biaxial, and the joints of toes and fingers are monaxial.



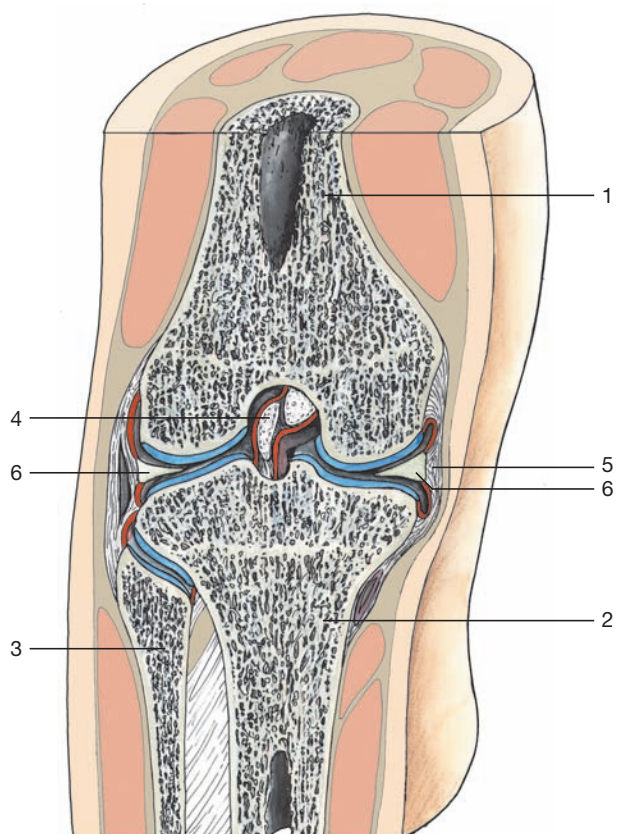
Coronal section through the knee joint (anterior aspect of the right joint in extension).



Coronal section through the knee joint (MRI scan).
(From Heuck et al., MRT-Atlas, 2009.)

- 1 Femur
- 2 Tibia
- 3 Fibula
- 4 Cruciate ligaments
- 5 Collateral ligaments
- 6 Meniscus

Joints are places of articulation allowing movements between bones. Synovial joints are characterized by a joint cavity enclosed by a joint capsule containing synovial fluid, which is produced by the articular capsule. The kind of movements depends not only on form and structure of the articulating bones but also on ligaments incorporated into the articular capsule. In some synovial joints, fibrocartilagenous articular discs develop, when the articulating surfaces of the bones are incongruous.



Schematic drawing of the knee joint as an example of a synovial joint, characterized by a joint cavity enclosed by a joint capsule (red) containing synovial fluid. Blue = articular cartilage.



Fusiform
(palmaris longus)

Bicipital
(biceps brachii)

Tricipital (triceps surae,
gastrocnemius, and soleus)

Quadricipital
(quadriceps femoris)

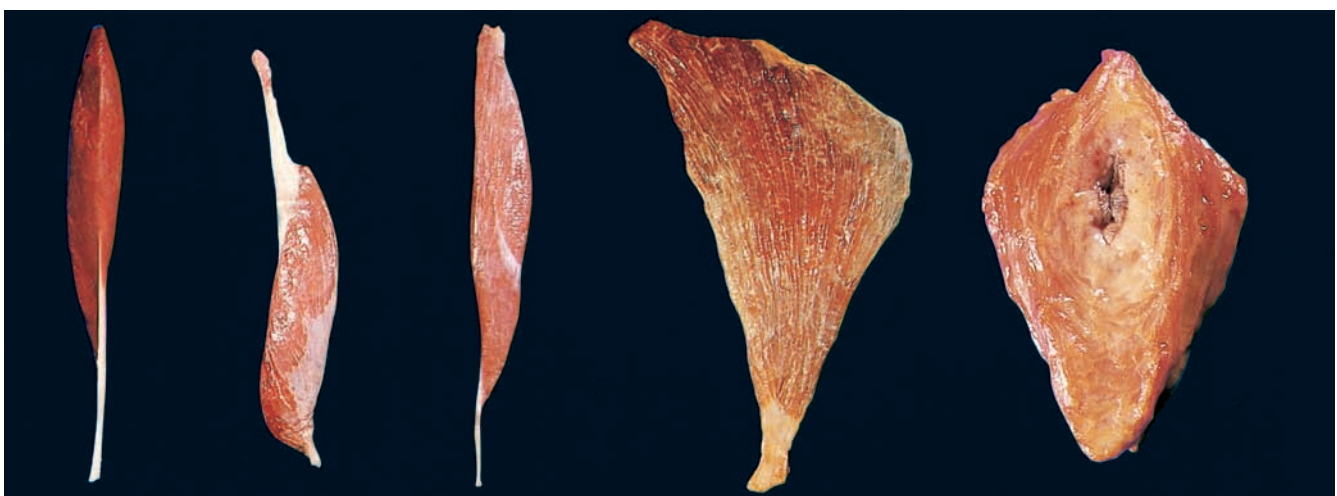


Digastric
(omohyoideus)

Multiventral
(rectus abdominis)

Multicaudal
(flexor digitorum prof.)

Serrated
(serratus anterior)



Bipennate
(tibialis anterior)

Unipennate
(semimembranosus)

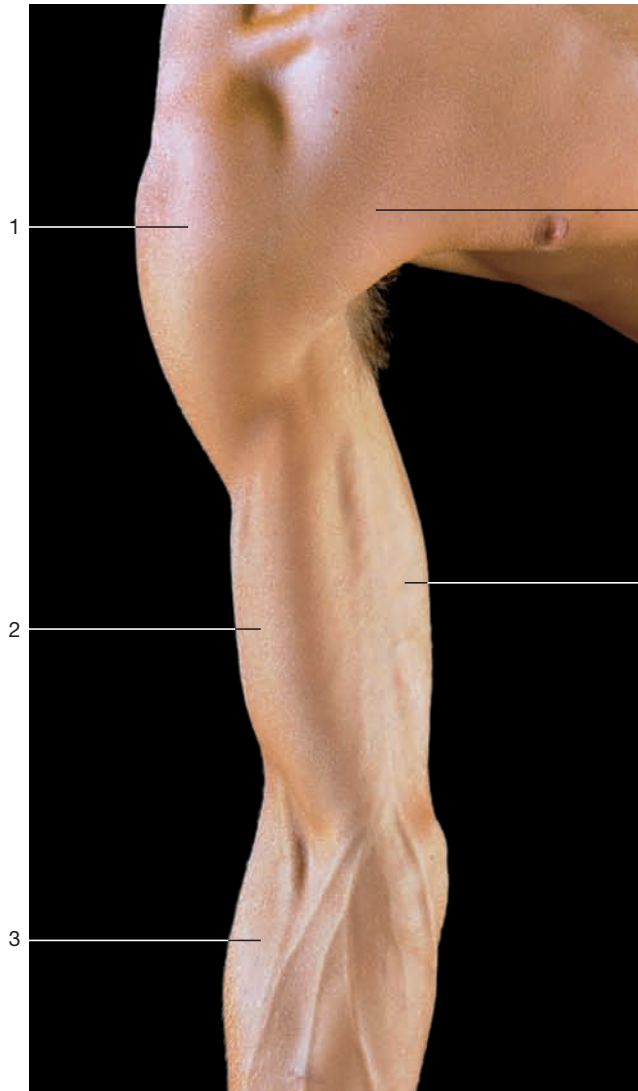
Semitendinous
(semitendinosus)

Broad, flat muscle
(latissimus dorsi)

Ring-like
(sphincter ani externus)

The human body possesses a **great variety of muscles**. The architecture of the muscles depends on the functional systems in which they are involved, i.e., the kind of move-

ments, the form of the joints with their specific ligaments, etc. The movements themselves vary to a great extent individually.



Ventral aspect of the right arm. The biceps muscle appears slightly contracted. In the area of the elbow joint, several subcutaneous veins can be recognized.

- 1 Deltoid muscle
- 2 Biceps brachii muscle
- 3 Brachioradialis muscle
- 4 Humerus
- 5 Triceps brachii muscle
- 6 Elbow joint
- 7 Brachialis muscle
- 8 Pectoralis major muscle
- 9 Radius
- 10 Ulna

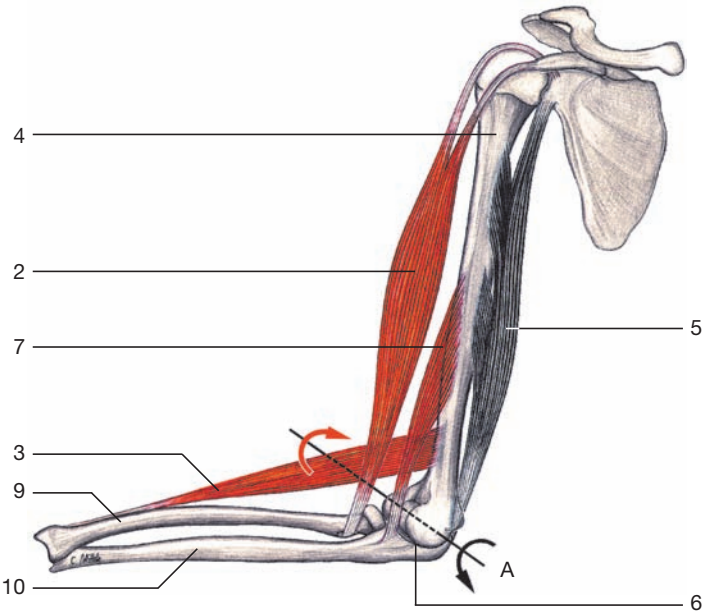
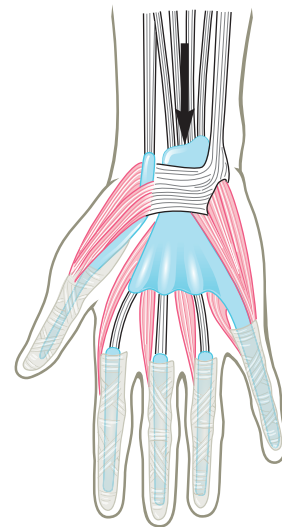


Diagram illustrating the position of the flexor and extensor muscles of the arm and their effect on the elbow joint.

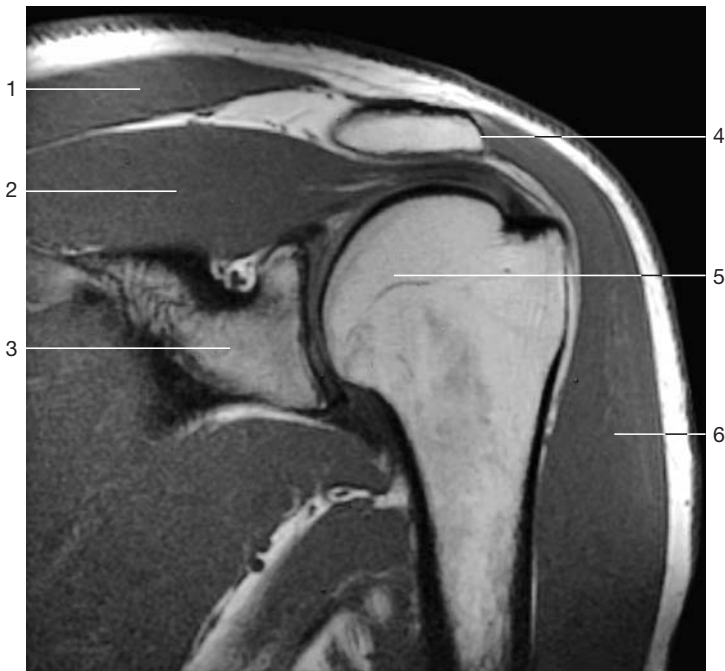
A: axis of humero-ulnar joint; arrows: direction of movements; red = flexion; black = extension.



Synovial sheaths of flexor tendons (palmar aspect of the right hand). The flexor retinaculum protects the flexor tendons passing through the carpal tunnel (arrow).

Joints are moved by muscles. The highly differentiated movements are coordinated by special groups of muscles (**synergists**). Their counterparts are called **antagonists**. Movements can only be carried out harmoniously if the contraction of the synergists are supported by a corresponding dilatation of the antagonists. This interaction is

controlled by the nervous system. In order to carry out certain directions of movements, often the tendons of muscles have to be directed by ligaments. At those places, the tendons often develop synovial sheaths, e.g., at the wrist joint or at the fingers.

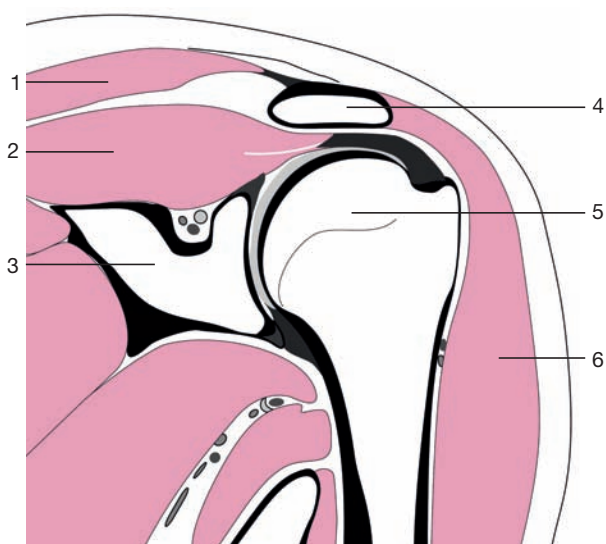


Frontal section through the shoulder joint (MRI scan).
(From Heuck et al., MRT-Atlas, 2009.)

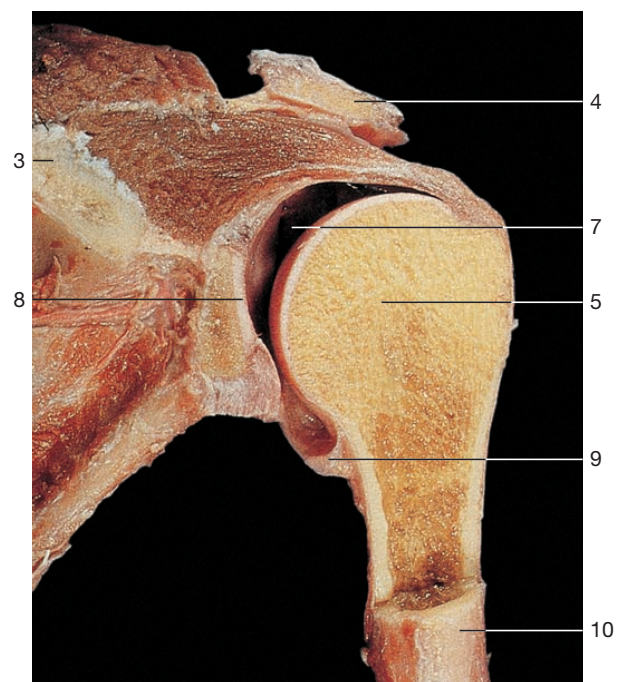


Frontal section through the shoulder joint (X-ray, a.-p. direction). (Courtesy of Dr. Holik, Spardorf, Germany.)

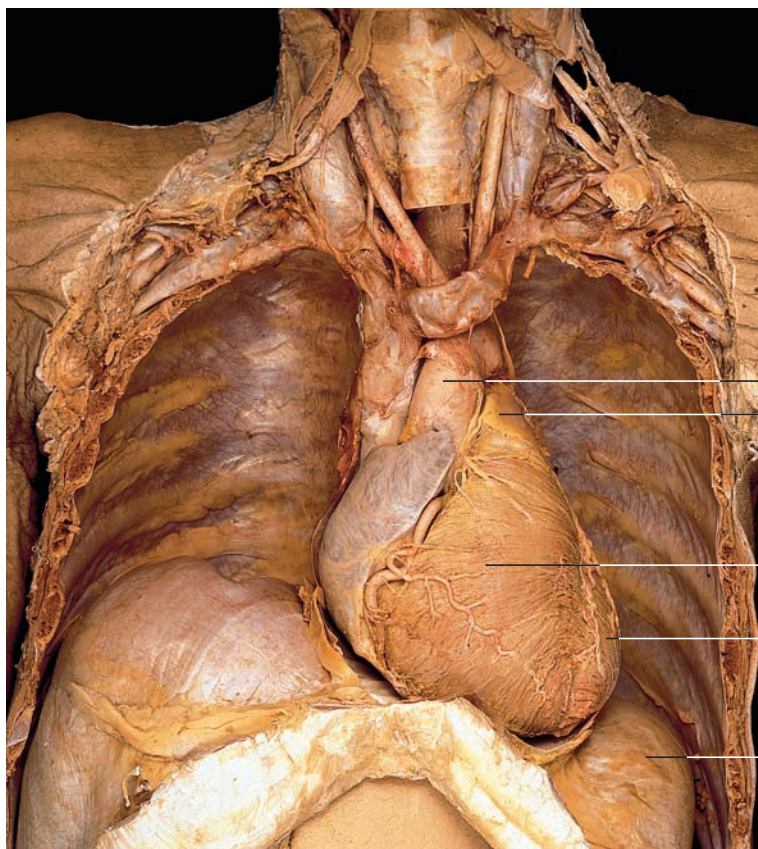
- | | |
|------------------------|----------------------------|
| 1 Trapezius muscle | 6 Deltoid muscle |
| 2 Supraspinatus muscle | 7 Cavity of shoulder joint |
| 3 Scapula | 8 Articular cartilage |
| 4 Acromion | 9 Articular cavity |
| 5 Head of humerus | 10 Humerus |



Frontal section through the shoulder joint (schematic drawing of the MRI scan above).

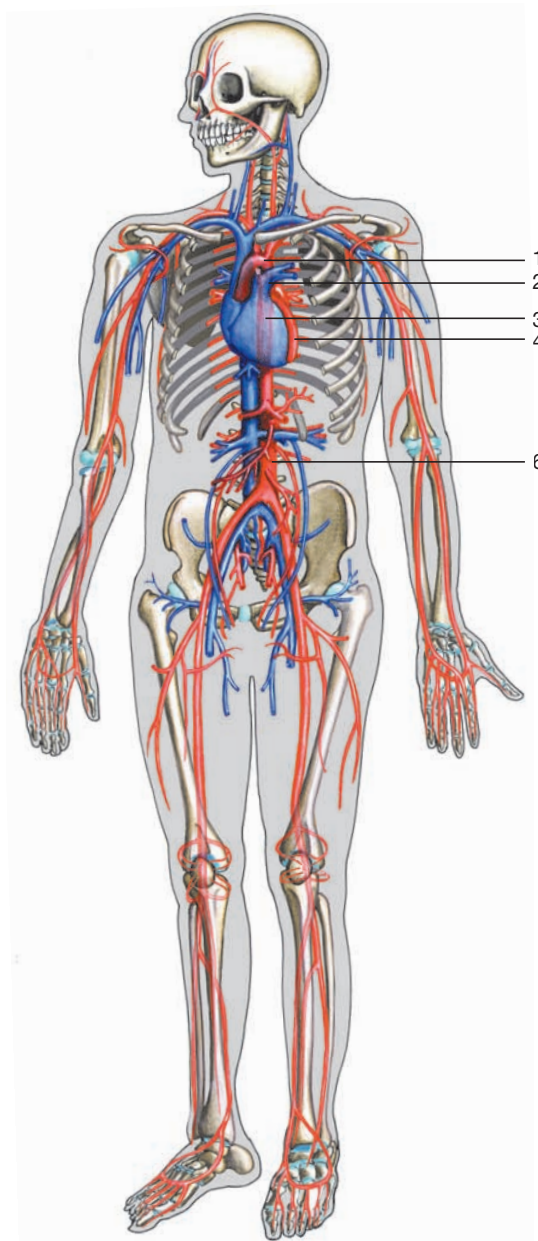


Frontal section through the shoulder joint (compare with the two pictures above).



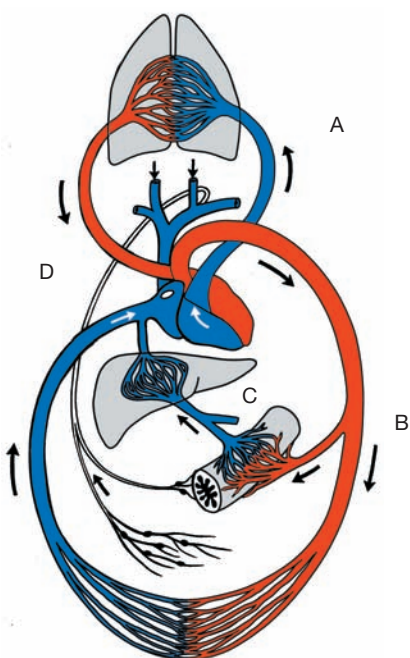
Heart and related vessels in situ (anterior aspect). Anterior thoracic wall, pericardium, and epicardium have been removed. The trachea is divided.

- | | |
|--------------------|-------------------|
| 1 Aorta | 4 Left heart |
| 2 Pulmonary artery | 5 Diaphragm |
| 3 Right heart | 6 Abdominal aorta |



Organization of the circulatory system with the heart in the center (anterior aspect).

Red = arteries; blue = veins.



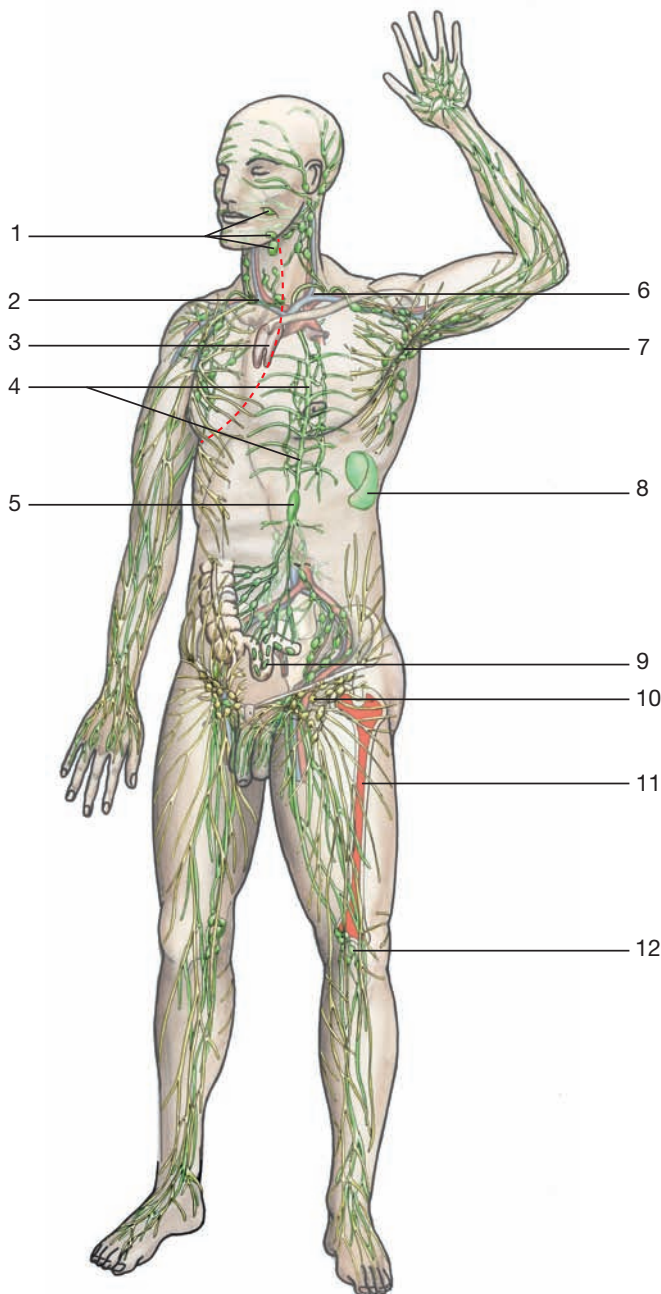
Organization of the circulatory systems in the human body.

The center of this system represents the heart.

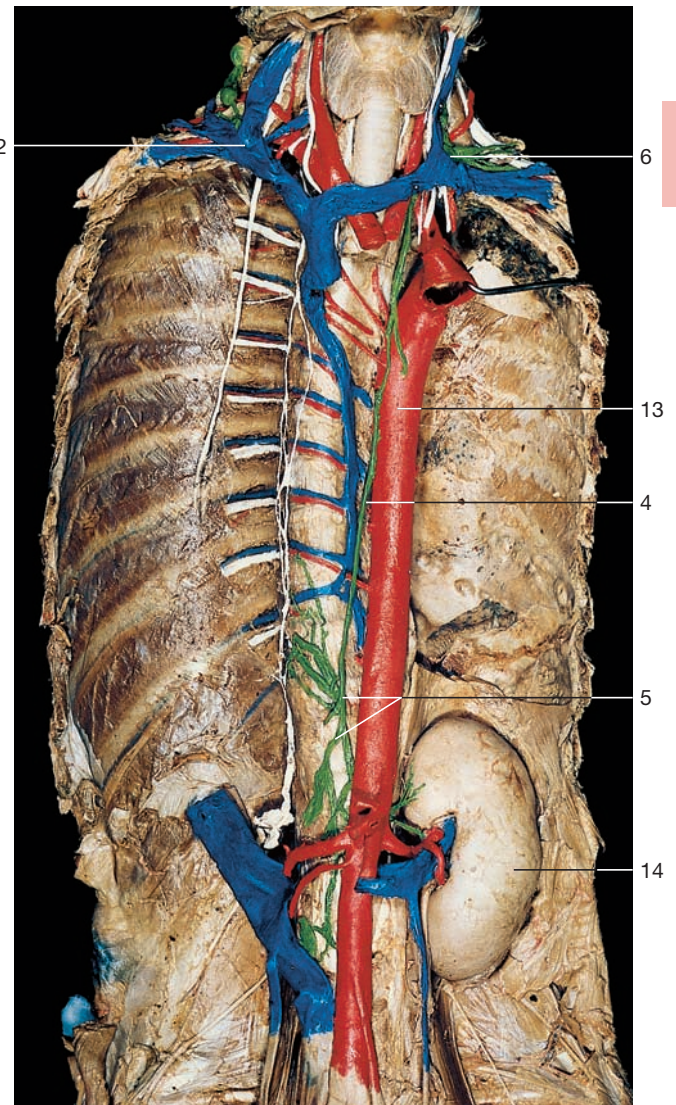
Red = arteries; blue = veins.

- | | |
|---------------------------|---------------------------|
| A = Pulmonary circulation | C = Portal circulation |
| B = Systemic circulation | D = Lymphatic circulation |

The center of the circulatory system is the heart, which is situated in the thoracic cavity and in contact with the diaphragm. In the right ventricle, the venous blood is collected and pumped through the pulmonary artery and into the lung where the blood is oxygenated. The veins of the lung transport the blood to the left ventricle, where it is pumped through the aorta and its branches (arteries) in the human body. Arteries and veins mostly run parallel. The venous blood from the intestine reaches the liver via the portal vein.



Organization of the lymphatic system (anterior aspect). Course of the main lymphatic vessels and location of the most important lymph nodes in the body. Red line = border between the lymphatic vessels draining to the left and right venous angles.



Major lymph vessels of the trunk (green). Blue = veins, red = arteries, white = nerves.

- | | |
|---|---------------------------------------|
| 1 Tonsils and submandibular lymph nodes | 8 Spleen |
| 2 Right venous angle | 9 Lymph nodes of the intestinal tract |
| 3 Remnants of the thymus gland | 10 Inguinal lymph nodes |
| 4 Thoracic duct | 11 Bone marrow |
| 5 Cisterna chyli | 12 Lymph nodes of the popliteal fossa |
| 6 Left venous angle | 13 Aorta |
| 7 Axillary lymph nodes | 14 Left kidney |

Lymphatic vessels originate in the tissue spaces (lymph capillaries) and unite to form larger vessels (lymphatics). These resemble veins but have a much thinner wall, more valves, and are interrupted by lymph nodes at various intervals. Large groups of lymph nodes are located in the inguinal and axillary regions, deep to the mandible and

sternocleidomastoid muscle, and within the root of the mesentery of the intestine. The lymphatic vessels of the right half of the head and neck, the right thorax, and the right upper limb drain toward the right venous angle; those of the rest of the body, toward the left venous angle.

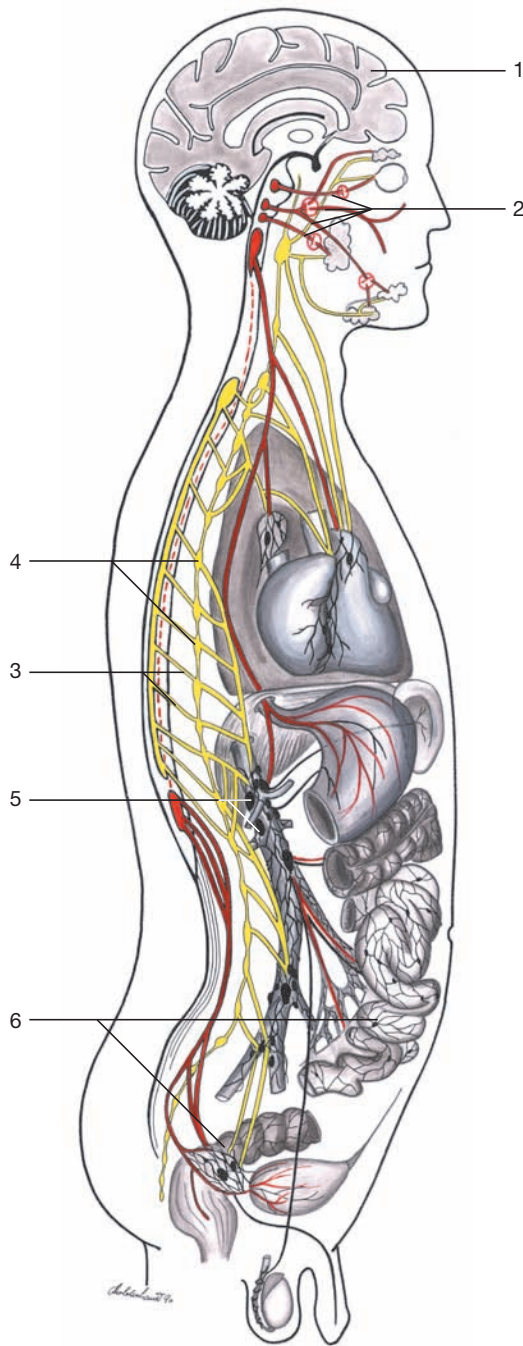
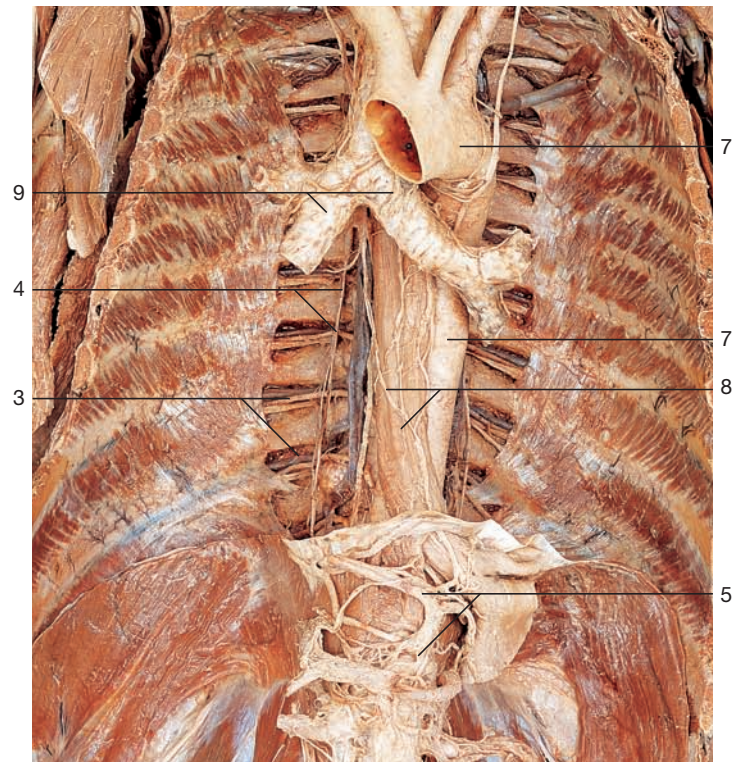


Diagram illustrating the localization of the three functional portions of the nervous system (brain, spinal cord and autonomic nervous system).
Yellow = sympathetic system;
red = parasympathetic system.

The nervous system can be divided into three functionally distinct parts:

1. The cranial part, which comprises the great sensory organs and the brain.
2. The spinal cord, which shows a segmental structure and serves predominantly as a reflex organ.
3. The autonomic nervous system, which controls the involuntary functions (subconscious control) of organs and tissues. The autonomic part of the nervous system forms many delicate plexuses near or within the organs.



Posterior part of the trunk. The solar plexus with its connection to the vagus nerve and the sympathetic trunk has been dissected.

- | | |
|---------------------|--|
| 1 Cerebrum | 6 Nervous plexus of the autonomic system |
| 2 Cranial nerves | 7 Aorta |
| 3 Spinal nerves | 8 Vagus nerve and esophagus |
| 4 Sympathetic trunk | 9 Bifurcation of trachea |
| 5 Solar plexus | |

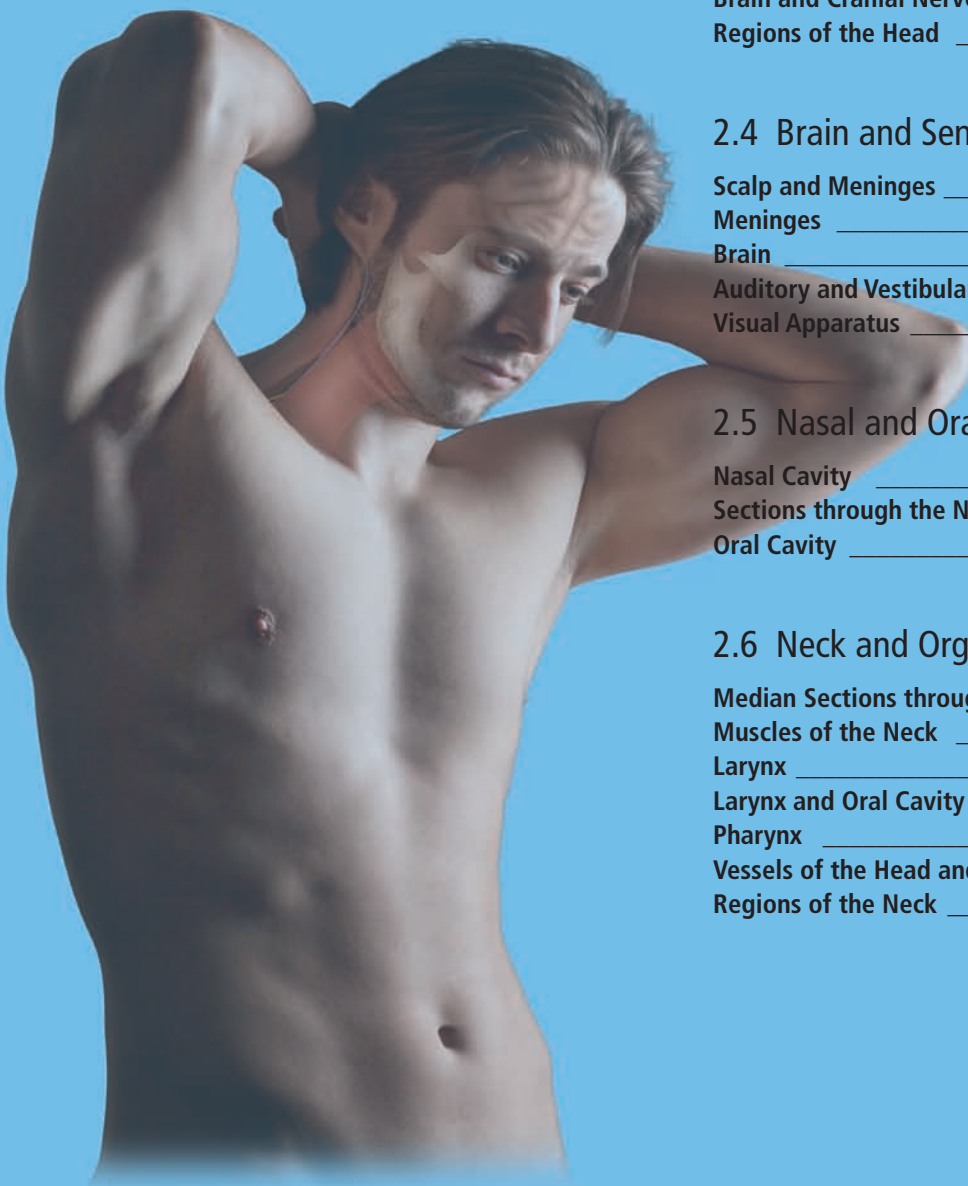
At certain places these plexuses contain aggregations of nerve cells (prevertebral and intramural ganglia).

The spinal nerves leave the spinal cord at regular intervals. The ventral rami of the spinal nerves form the cervical and brachial plexus, which innervates the upper extremity, and the ventral rami of the lumbar and sacral spinal nerves form the lumbosacral plexus, which innervates the pelvis and genital organs and the lower extremity.

2 Head and Neck

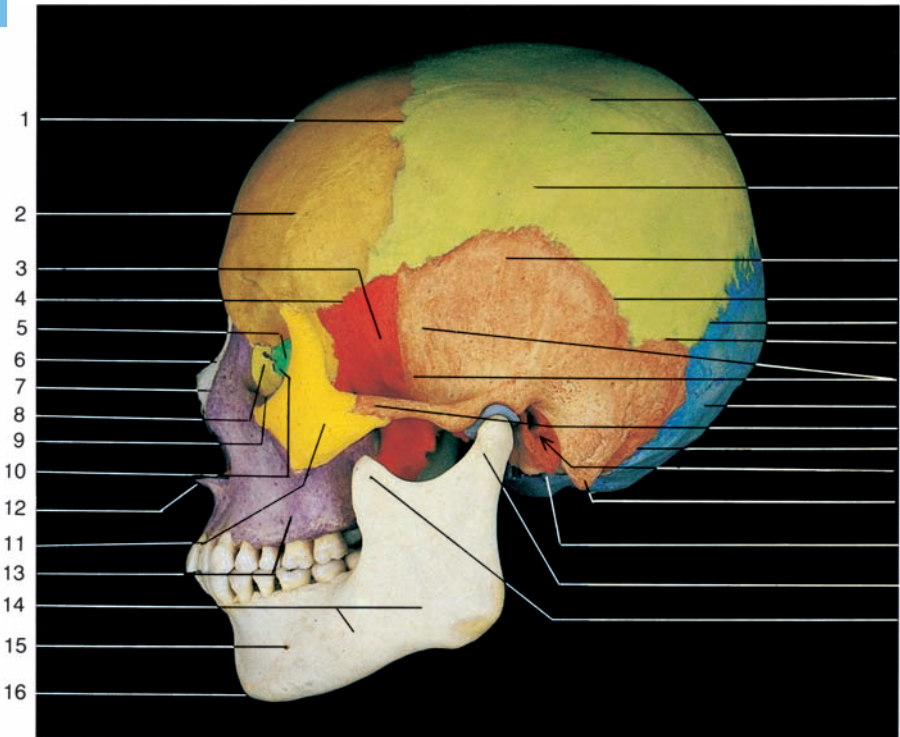


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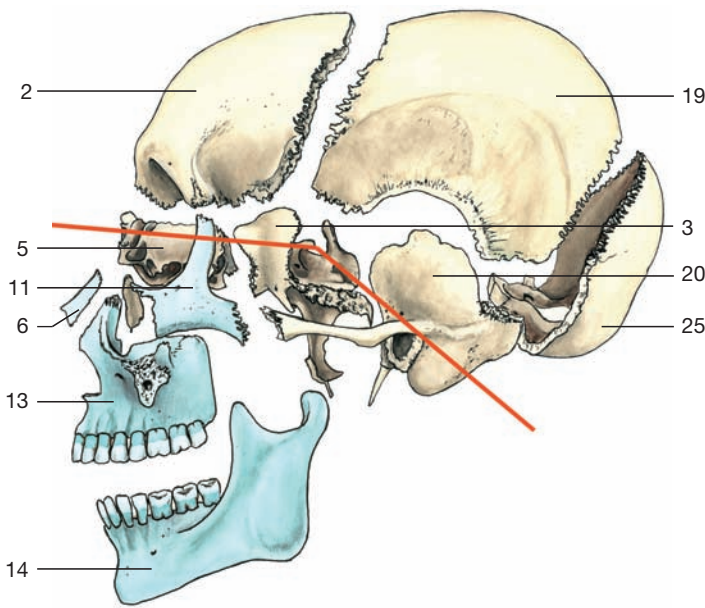


2.1 Skull



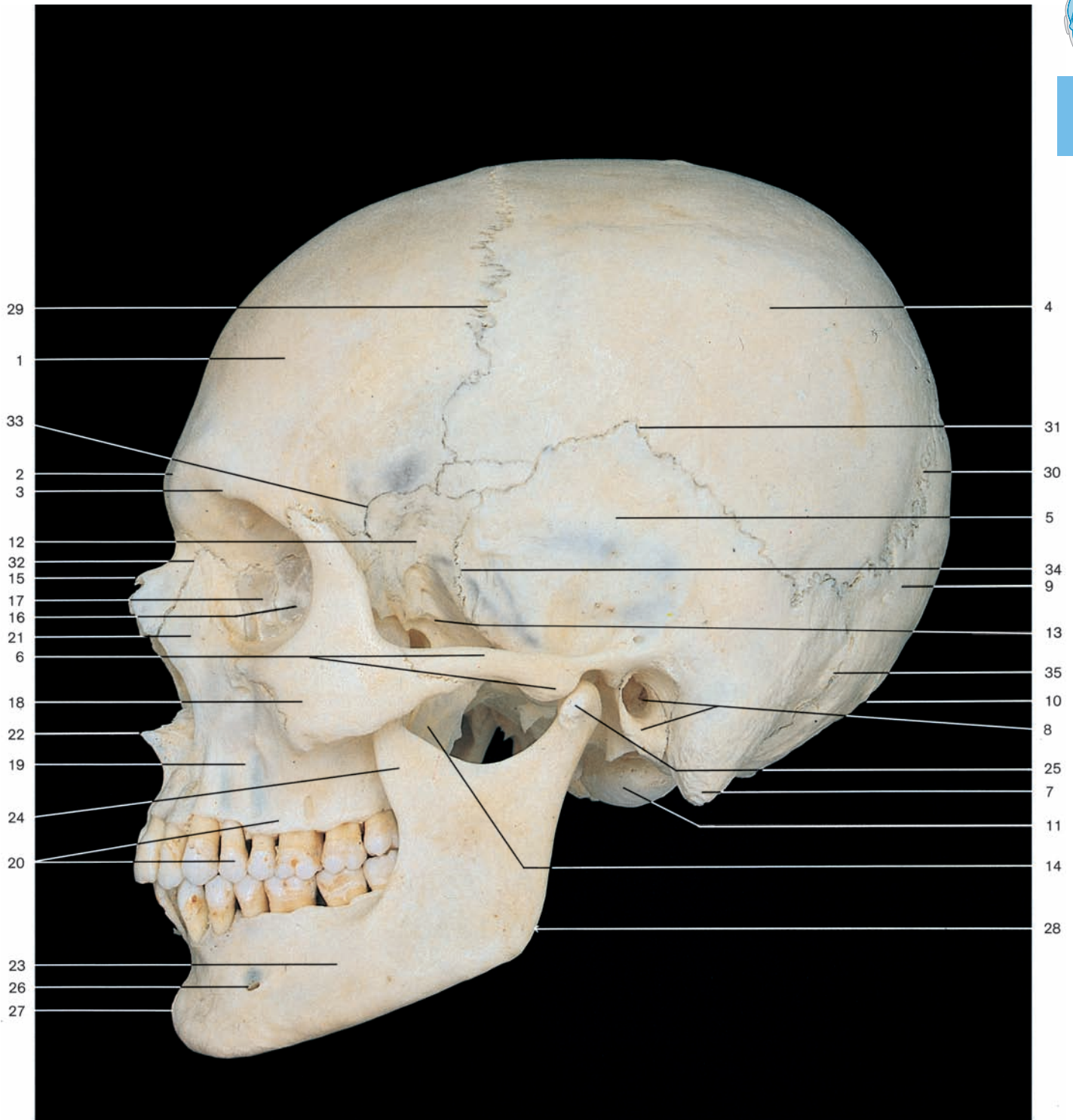
- 1 Coronal suture
- 2 Frontal bone
- 3 Sphenoidal bone
- 4 Sphenofrontal suture
- 5 Ethmoidal bone
- 6 Nasal bone
- 7 Nasomaxillary suture
- 8 Lacrimal bone
- 9 Lacrimomaxillary suture
- 10 Ethmoidolacrimal suture
- 11 Zygomatic bone
- 12 Anterior nasal spine
- 13 Maxilla
- 14 Mandible
- 15 Mental foramen
- 16 Mental protuberance
- 17 Superior temporal line
- 18 Inferior temporal line
- 19 Parietal bone
- 20 Temporal bone
- 21 Squamous suture
- 22 Lambdoid suture
- 23 Temporal fossa
- 24 Parietomastoid suture
- 25 Occipital bone
- 26 Zygomatic arch
- 27 Occipitomastoid suture
- 28 External acoustic meatus
- 29 Mastoid process
- 30 Tympanic portion of temporal bone
- 31 Condylar process of mandible
- 32 Coronoid process of mandible

General architecture of the skull (lateral aspect). The different bones are indicated in color (compare with the table).



Disarticulated skull (lateral aspect). The facial bones are blue colored. Red line = angle of the clivus.

2 Frontal bone (orange) 19 Parietal bone (light yellow) 3 Greater wing of sphenoidal bone (red) 25 Squama of occipital bone (blue) 20 Squama of temporal bone (brown)	Cranial bones
5 Ethmoidal bone (dark green) 3 Sphenoidal bone (red) Temporal bone excluding squama (brown) 30 Tympanic portion of temporal bone (dark brown) Occipital bone excluding squama (blue)	Base of skull
6 Nasal bone (white) 8 Lacrimal bone (light yellow) Inferior nasal concha Vomer 11 Zygomatic bone (dark yellow) Palatine bone 13 Maxilla (violet) 14 Mandible (white)	Facial bones
Malleus Incus Stapes	Auditory ossicles
} within petrous portion of temporal bone	
Hyoid	

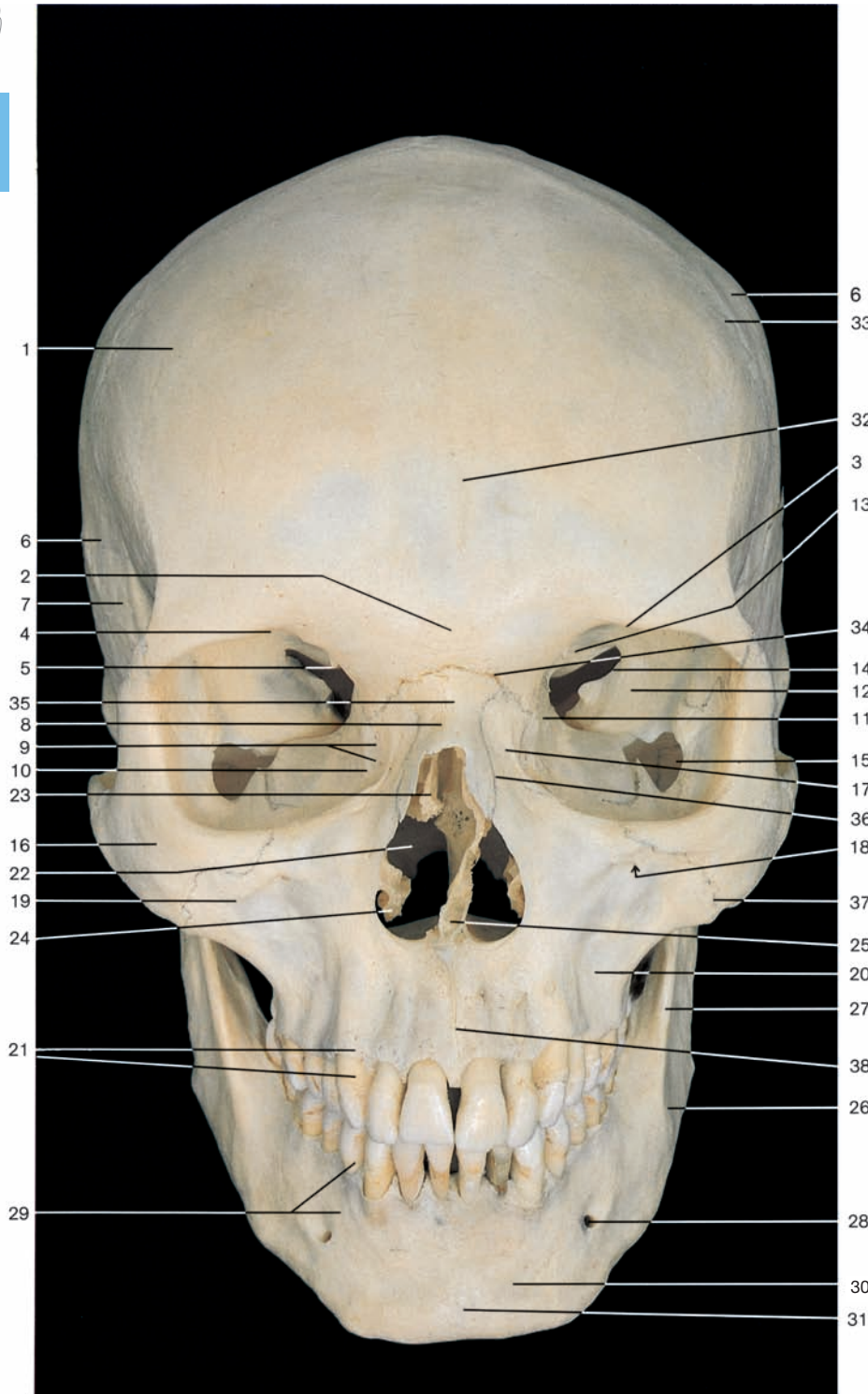


Lateral aspect of the skull.

- | | | |
|---|--|--------------------------|
| 1 Frontal bone | 12 Sphenoidal bone (greater wing) | 25 Condylar process |
| 2 Glabella | 13 Infratemporal crest of sphenoid | 26 Mental foramen |
| 3 Supraorbital margin | 14 Pterygoid process (lateral pterygoid plate) | 27 Mental protuberance |
| 4 Parietal bone | 15 Nasal bone | 28 Angle of the mandible |
| 5 Temporal bone (squamous part) | 16 Ethmoidal bone (orbital part) | |
| 6 Zygomatic process (articular tubercle) | 17 Lacrimal bone | |
| 7 Mastoid process | 18 Zygomatic bone | |
| 8 Tympanic part (tympanic plate) and external acoustic meatus | 19 Maxilla (body) | |
| 9 Occipital bone (squamous part) | 20 Alveolar process and teeth | |
| 10 External occipital protuberance | 21 Frontal process | |
| 11 Occipital condyle | 22 Anterior nasal spine | |
| | 23 Mandible (body) | |
| | 24 Coronoid process | |

Sutures

- | |
|---------------------------|
| 29 Coronal suture |
| 30 Lambdoid suture |
| 31 Squamous suture |
| 32 Nasomaxillary suture |
| 33 Frontosphenoid suture |
| 34 Sphenosquamosal suture |
| 35 Occipitomastoid suture |



Anterior aspect of the skull.

- 1 Frontal bone
- 2 Glabella
- 3 Supra-orbital margin
- 4 Supra-orbital notch
- 5 Trochlear spine
- 6 Parietal bone
- 7 Temporal bone
- 8 Nasal bone

Orbit

- 9 Lacrimal bone
- 10 Posterior lacrimal crest
- 11 Ethmoidal bone

Sphenoidal bone

- 12 Greater wing of sphenoidal bone
- 13 Lesser wing of sphenoidal bone
- 14 Superior orbital fissure
- 15 Inferior orbital fissure
- 16 Zygomatic bone

Maxilla

- 17 Frontal process
- 18 Infra-orbital foramen
- 19 Zygomatic process
- 20 Body of maxilla
- 21 Alveolar process with teeth

Nasal cavity

- 22 Anterior nasal aperture
- 23 Middle nasal concha
- 24 Inferior nasal concha
- 25 Nasal septum, vomer

Mandible

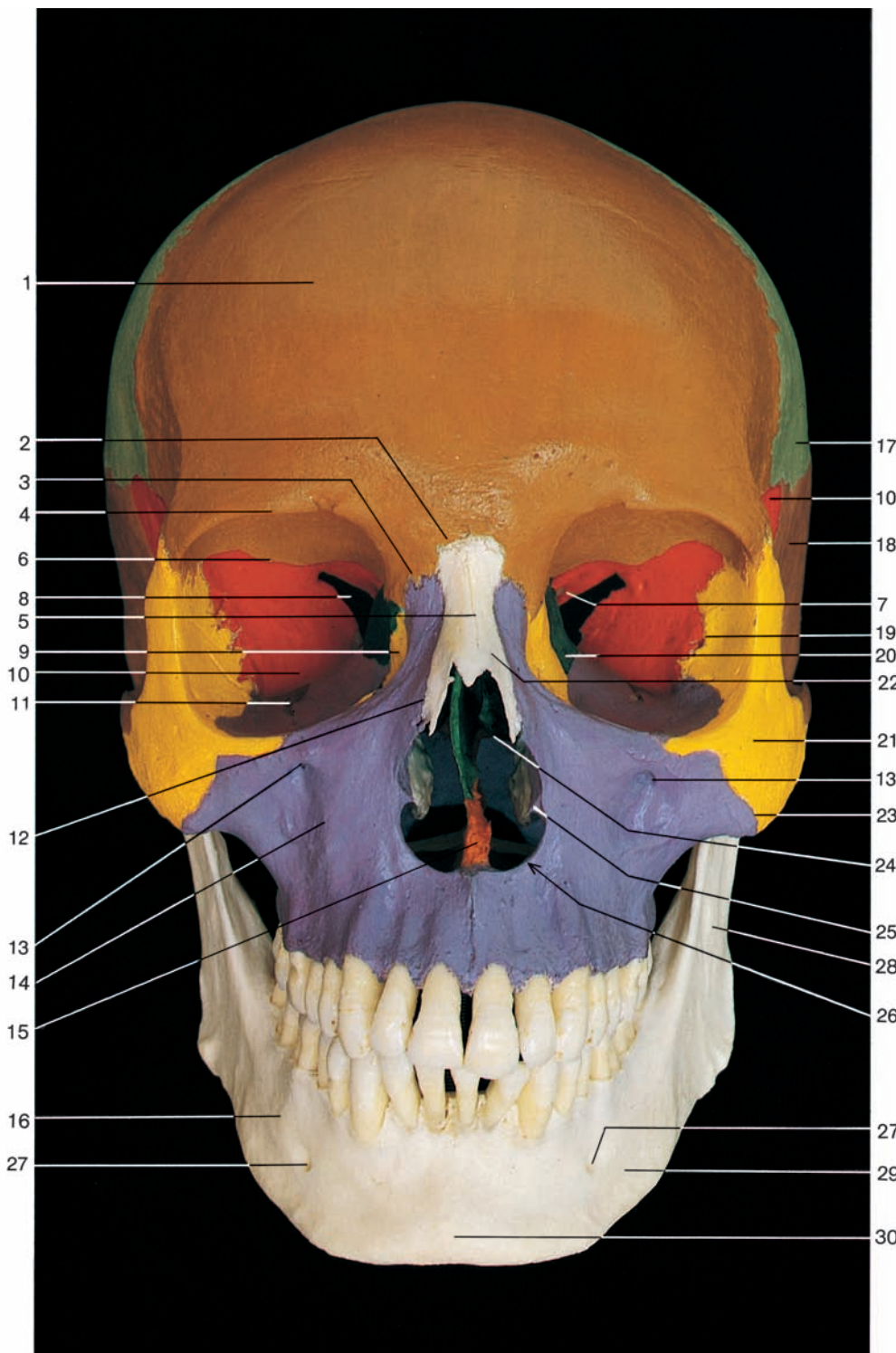
- 26 Body of mandible
- 27 Ramus of mandible
- 28 Mental foramen
- 29 Alveolar part with teeth
- 30 Base of mandible
- 31 Mental protuberance

Sutures

- 32 Frontal suture
- 33 Coronal suture
- 34 Frontonasal suture
- 35 Internasal suture
- 36 Nasomaxillary suture
- 37 Zygomaticomaxillary suture
- 38 Intermaxillary suture

The skull comprises a mosaic of numerous complicated bones that form the cranial cavity protecting the brain (**neurocranium**) and several cavities such as the nasal and oral cavities in the facial region. The neurocranium consists of large bony plates that develop directly from the surrounding sheets of connective tissue (**desmocranium**).

The bones of the skull base are formed out of cartilaginous tissue (**chondrocranium**), which ossifies secondarily. The **visceral skeleton**, which in fish gives rise to the gills, has in higher vertebrates been transformed into the bones of the masticatory and auditory apparatus (maxilla, mandible, auditory ossicles, and hyoid bone).



- 1 Frontal bone
- 2 Frontonasal suture
- 3 Frontomaxillary suture
- 4 Supra-orbital margin
- 5 Internasal suture
- 6 Sphenofrontal suture
- 7 Optic canal in lesser wing of sphenoidal bone
- 8 Superior orbital fissure
- 9 Lacrimal bone
- 10 Sphenoidal bone (greater wing)
- 11 Inferior orbital fissure
- 12 Nasomaxillary suture
- 13 Infra-orbital foramen
- 14 Maxilla
- 15 Vomer
- 16 Body of mandible
- 17 Parietal bone
- 18 Temporal bone
- 19 Sphenozygomatic suture
- 20 Ethmoidal bone
- 21 Zygomatic bone
- 22 Nasal bone
- 23 Zygomaticomaxillary suture
- 24 Middle nasal concha
- 25 Inferior nasal concha
- 26 Anterior nasal aperture
- 27 Mental foramen
- 28 Ramus of mandible
- 29 Base of mandible
- 30 Mental protuberance

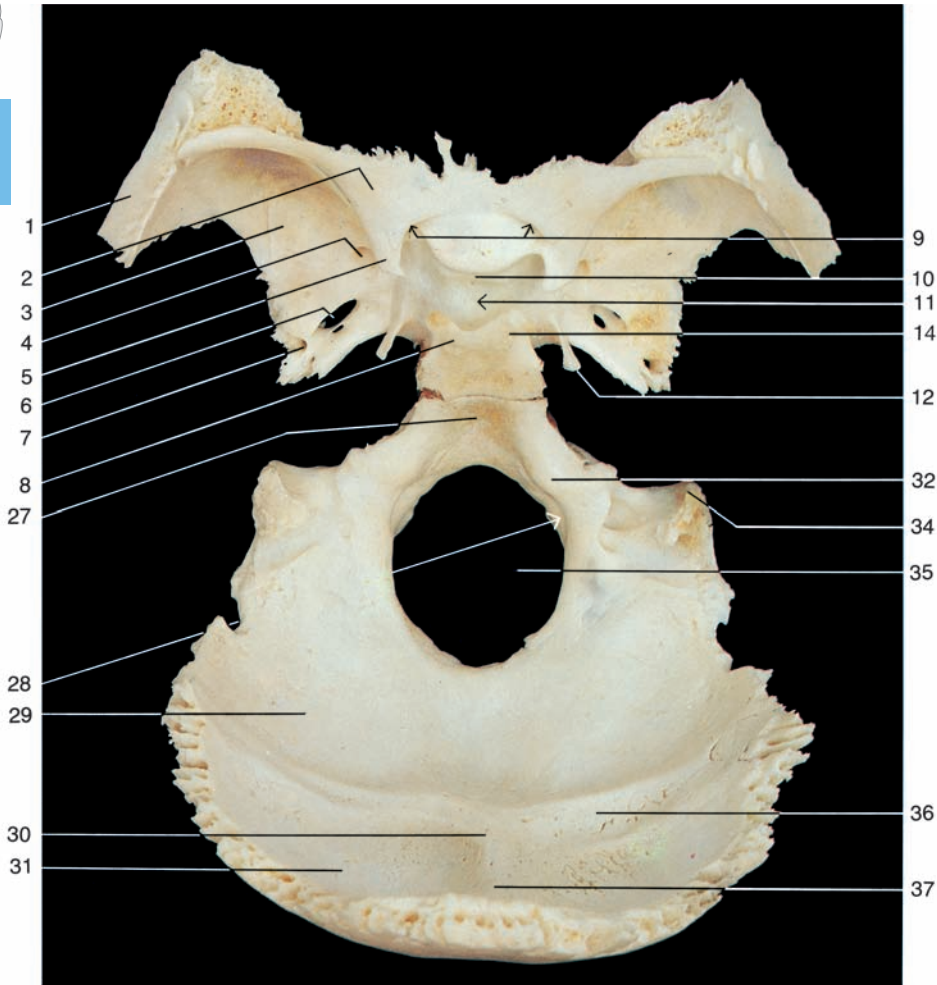
Bones

Brown	= frontal bone
Light green	= parietal bone
Dark brown	= temporal bone
Red	= sphenoidal bone
Yellow	= zygomatic bone
Dark green	= ethmoidal bone
Yellow	= lacrimal bone
Orange	= vomer
Violet	= maxilla
White	= nasal bone
White	= mandible

Anterior aspect of the skull (individual bones indicated by color).

The following series of figures are arranged so that the mosaic-like pattern of the skull becomes understandable. It starts with the bones of the **skull base** (sphenoidal and occipital bones) to which the other bones are added step by

step. The facial skeleton is built up by the ethmoidal bone to which the palatine bone and maxilla are attached laterally; the small nasal and lacrimal bones fill the remaining spaces. Cartilages remain only in the external part of the nose.



Sphenoidal and occipital bones (from above).



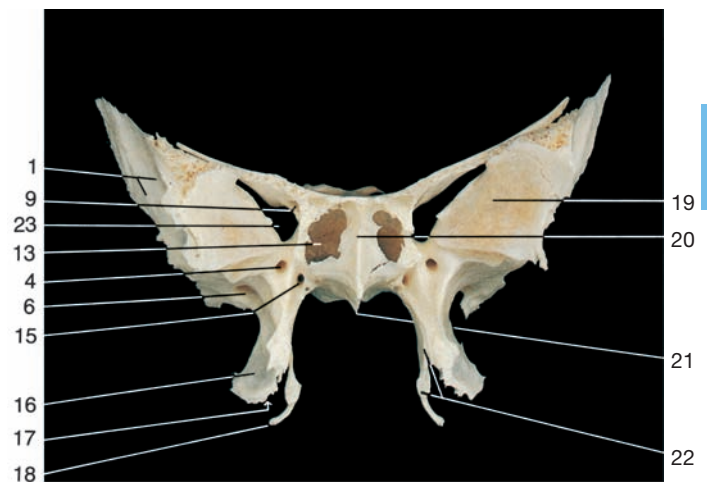
Sphenoidal and occipital bones in connection with the atlas and axis (first and second cervical vertebrae) (left lateral view).

Sphenoidal bone

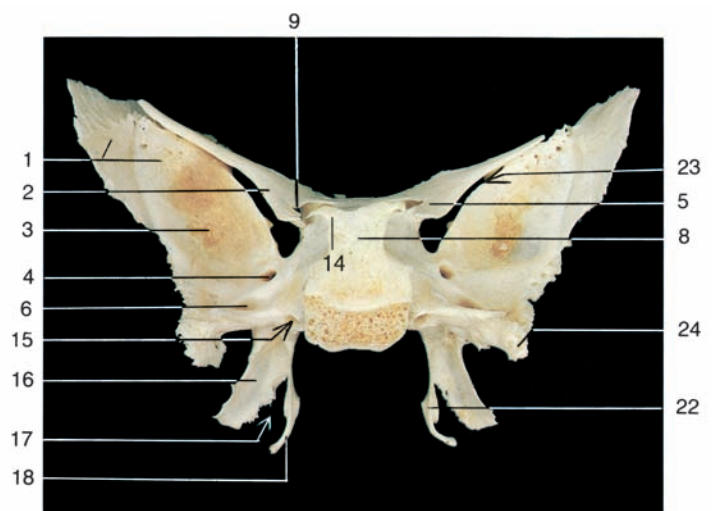
- 1 Greater wing
- 2 Lesser wing
- 3 Cerebral or superior surface of greater wing
- 4 Foramen rotundum
- 5 Anterior clinoid process
- 6 Foramen ovale
- 7 Foramen spinosum
- 8 Dorsum sellae
- 9 Optic canal
- 10 Chiasmatic groove (sulcus chiasmatis)
- 11 Hypophysial fossa (sella turcica)
- 12 Lingula
- 13 Opening of sphenoidal sinus
- 14 Posterior clinoid process
- 15 Pterygoid canal
- 16 Lateral pterygoid plate of pterygoid process
- 17 Pterygoid notch
- 18 Pterygoid hamulus
- 19 Orbital surface of greater wing
- 20 Sphenoidal crest
- 21 Sphenoidal rostrum
- 22 Medial pterygoid plate
- 23 Superior orbital fissure
- 24 Spine of sphenoid
- 25 Temporal surface of greater wing
- 26 Infratemporal crest

Occipital bone

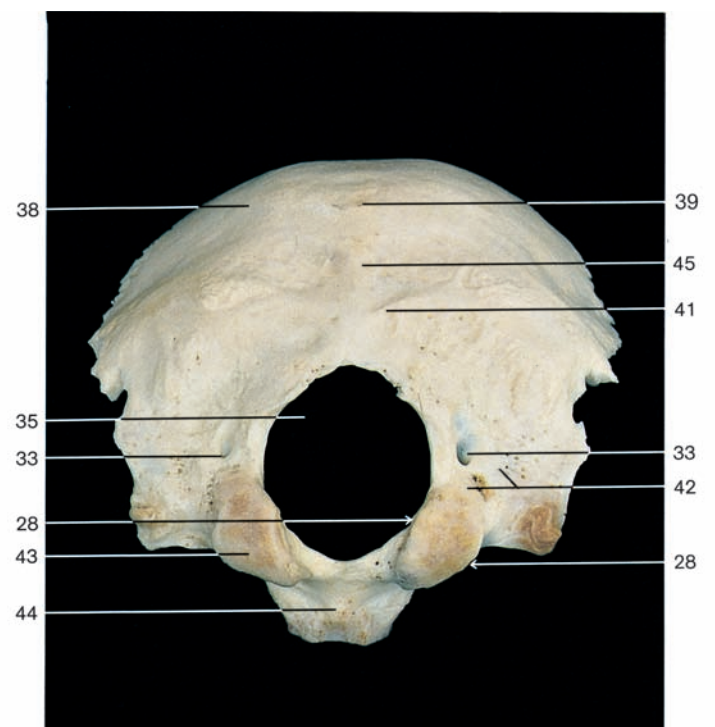
- 27 Clivus with basilar part of occipital bone
- 28 Hypoglossal canal
- 29 Fossa for cerebellar hemisphere
- 30 Internal occipital protuberance
- 31 Fossa for cerebellar hemisphere
- 32 Jugular tubercle
- 33 Condylar canal
- 34 Jugular process
- 35 Foramen magnum
- 36 Groove for transverse sinus
- 37 Groove for superior sagittal sinus
- 38 Squamous part of the occipital bone
- 39 External occipital protuberance
- 40 Superior nuchal line
- 41 Inferior nuchal line
- 42 Condylar fossa
- 43 Condyle
- 44 Pharyngeal tubercle
- 45 External occipital crest



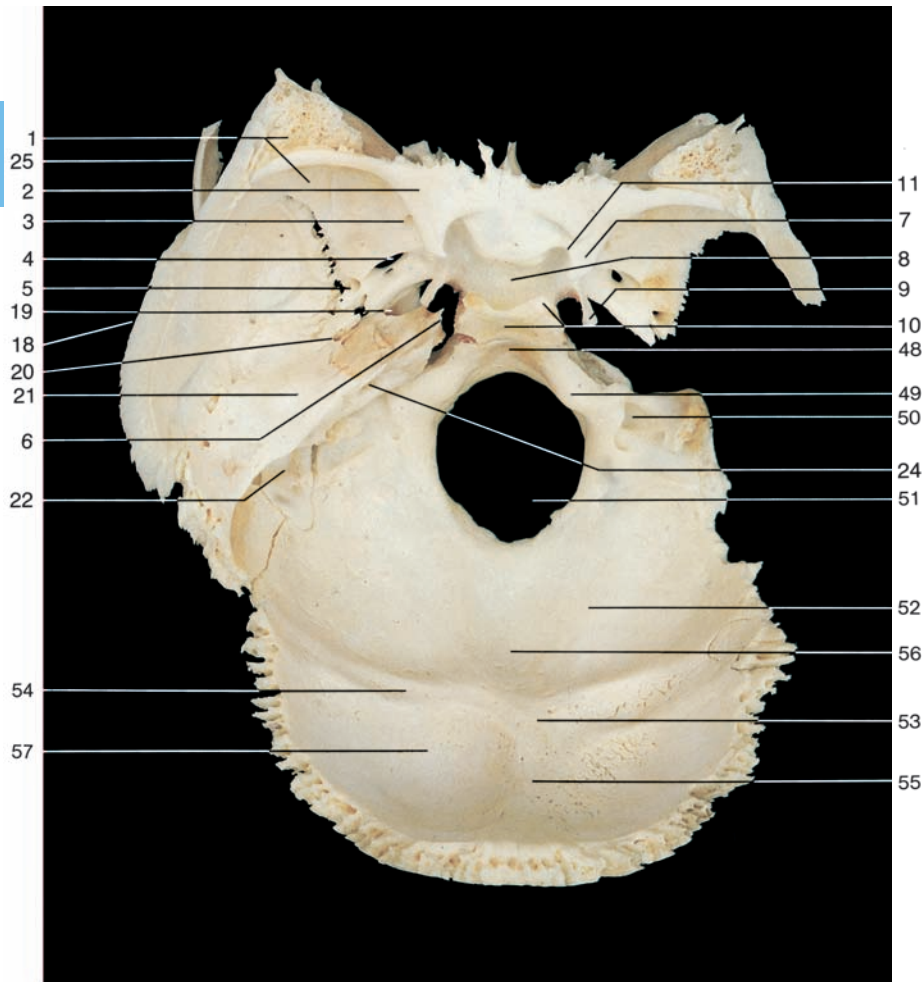
Sphenoidal bone (anterior aspect).



Sphenoidal bone (posterior aspect).



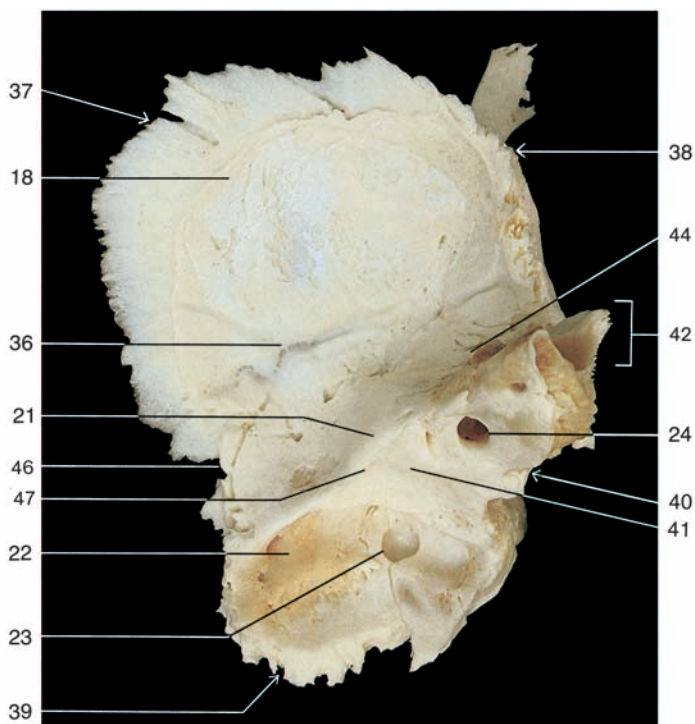
Occipital bone (from below).



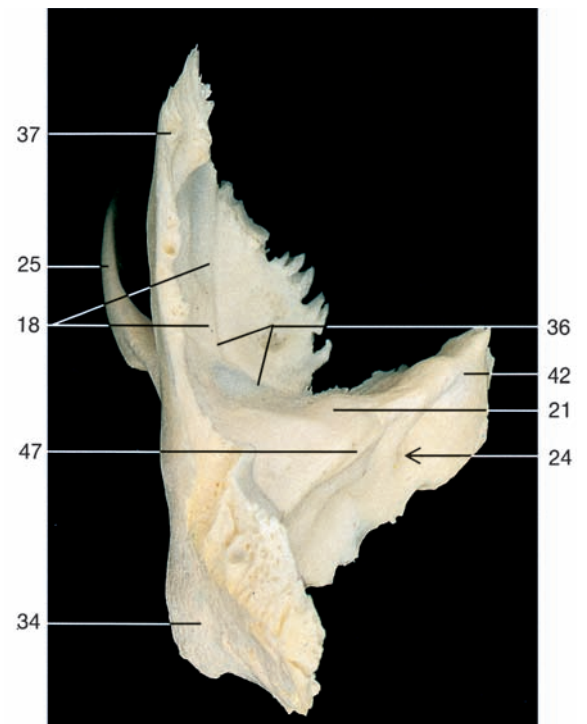
Sphenoidal bone

- 1 Greater wing
- 2 Lesser wing
- 3 Foramen rotundum
- 4 Foramen ovale
- 5 Foramen spinosum
- 6 Foramen lacerum
- 7 Anterior clinoid process
- 8 Hypophysial fossa (sella turcica)
- 9 Lingula
- 10 Dorsum sellae and posterior clinoid process
- 11 Optic canal
- 12 Sphenoidal rostrum
- 13 Medial pterygoid plate
- 14 Lateral pterygoid plate
- 15 Pterygoid hamulus
- 16 Infratemporal crest
- 17 Body of the sphenoidal bone

Sphenoidal, occipital, and left temporal bones (from above). Internal aspect of the base of the skull. The left temporal bone has been added to the preceding figure.



Left temporal bone (medial aspect).



Left temporal bone (from above).



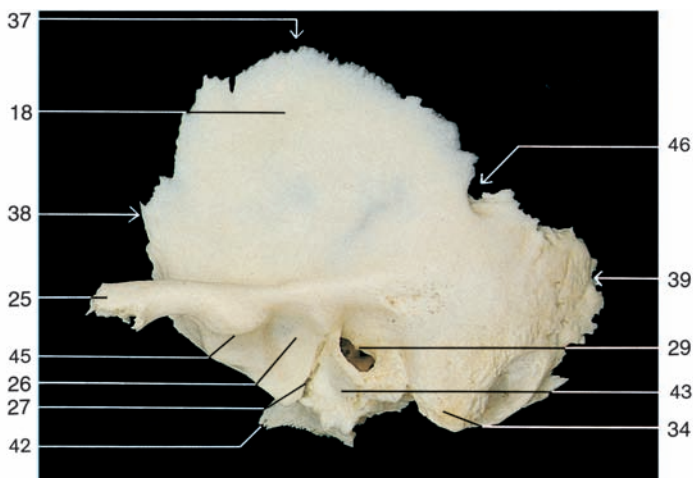
Sphenoidal, occipital, and left temporal bones. Base of the skull (external aspect).

Temporal bone

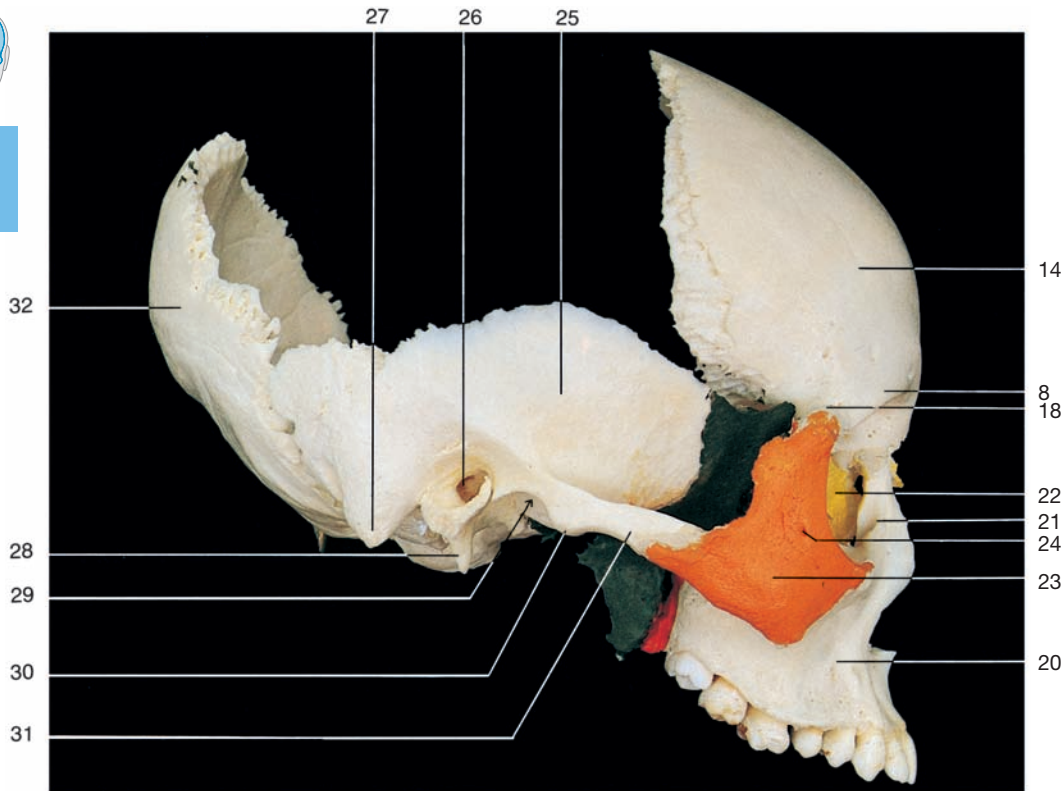
- 18 Squamous part
- 19 Carotid canal
- 20 Hiatus of facial canal (for the greater petrosal nerve)
- 21 Arcuate eminence
- 22 Groove for the sigmoid sinus
- 23 Mastoid foramen
- 24 Internal acoustic meatus
- 25 Zygomatic process
- 26 Mandibular fossa
- 27 Petrotympanic fissure
- 28 Canalis musculotubarius (bony part of auditory tube)
- 29 External acoustic meatus
- 30 Styloid process (remnant only)
- 31 Stylomastoid foramen
- 32 Mastoid canaliculus
- 33 Jugular fossa
- 34 Mastoid process
- 35 Mastoid notch
- 36 Groove for middle meningeal vessels
- 37 Parietal margin
- 38 Sphenoidal margin
- 39 Occipital margin
- 40 Cochlear canaliculus
- 41 Aqueduct of the vestibule
- 42 Apex of the petrous part
- 43 Tympanic part
- 44 Trigeminal impression
- 45 Articular tubercle
- 46 Parietal notch
- 47 Groove for the superior petrosal sinus

Occipital bone

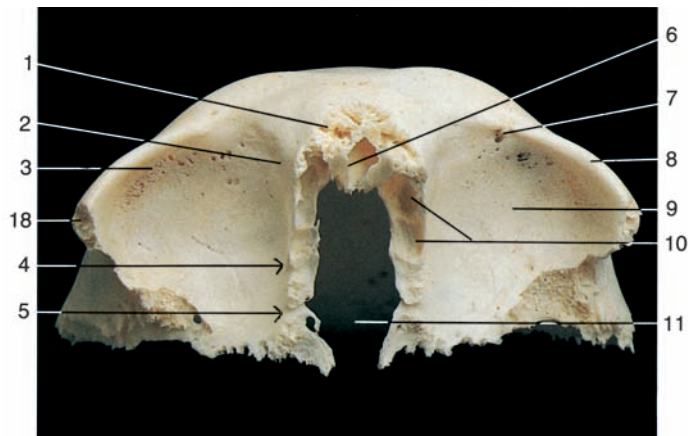
- 48 Clivus
- 49 Jugular tubercle
- 50 Condylar canal
- 51 Foramen magnum
- 52 Lower part of squamous occipital bone (cerebellar fossa)
- 53 Internal occipital protuberance
- 54 Groove for the transverse sinus
- 55 Groove for the superior sagittal sinus
- 56 Internal occipital crest
- 57 Upper part of squamous occipital bone (cerebral fossa)
- 58 Condyle
- 59 Nuchal plane
- 60 Superior nuchal line
- 61 External occipital protuberance
- 62 Jugular foramen
- 63 Inferior nuchal line
- 64 Pharyngeal tubercle
- 65 Spheno-occipital synchondrosis



Left temporal bone (lateral aspect).



Part of a disarticulated skull (right lateral aspect). The frontal bone and the maxilla are connected with the temporal bone by the zygomatic bone (orange). Sphenoidal bone (black), palatine bone (red), lacrimal bone (yellow).



Frontal bone (inferior aspect). The ethmoidal foveolae cover the ethmoidal cavities of the ethmoidal bone.



Frontal bone (posterior aspect).

Frontal bone

- 1 Nasal margin
- 2 Trochlear fossa
- 3 Fossa for lacrimal gland
- 4 Anterior ethmoidal foramen
- 5 Posterior ethmoidal foramen
- 6 Nasal spine
- 7 Supra-orbital notch
- 8 Supra-orbital margin
- 9 Orbital plate
- 10 Roofs of the ethmoidal air cells
- 11 Ethmoidal notch
- 12 Parietal margin
- 13 Groove for superior sagittal sinus
- 14 Squamous part of frontal bone
- 15 Frontal crest
- 16 Foramen cecum
- 17 Nasal spine
- 18 Zygomatic process of frontal bone
- 19 Jura cerebraia

Facial bones

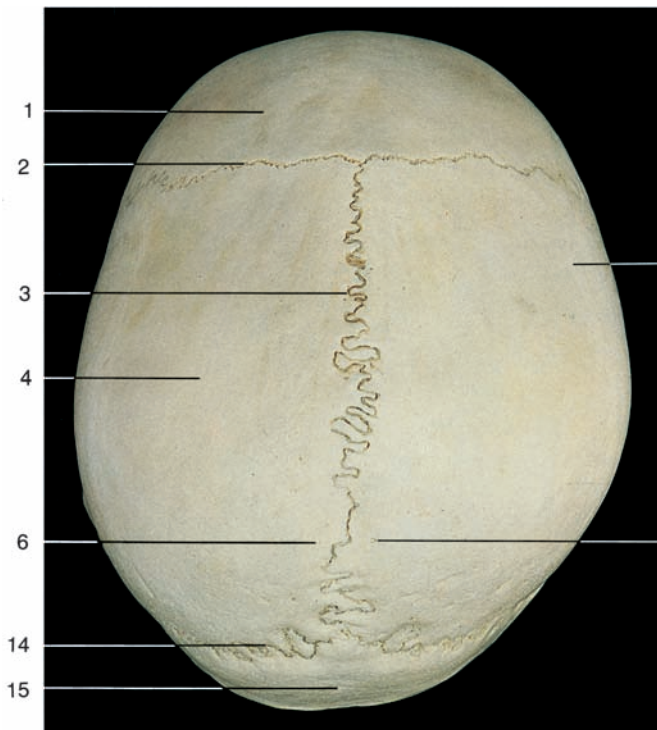
- 20 Maxilla
- 21 Frontal process of maxilla
- 22 Lacrimal bone (yellow)
- 23 Zygomatic bone (orange)
- 24 Zygomaticofacial foramen

Temporal bone

- 25 Squamous part of temporal bone
- 26 External acoustic meatus
- 27 Mastoid process
- 28 Styloid process
- 29 Mandibular fossa
- 30 Articular tubercle
- 31 Zygomatic process

Occipital bone

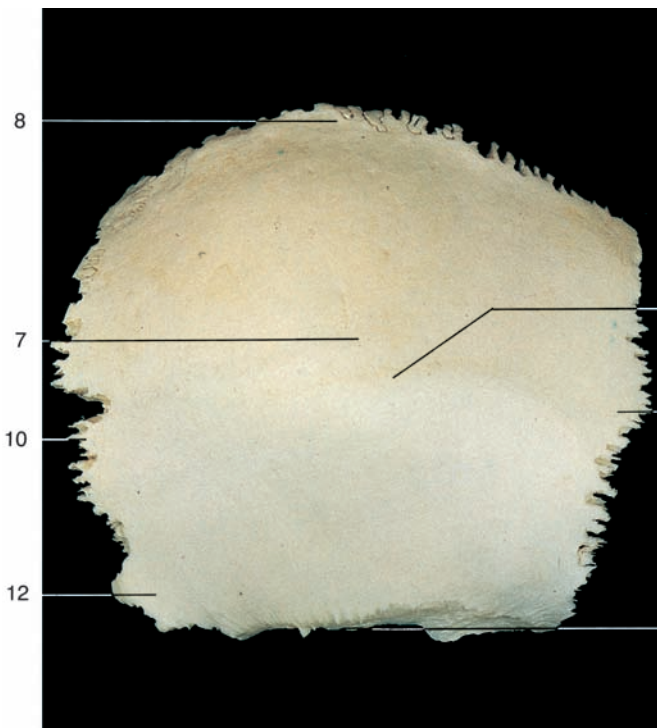
- 32 Squamous part of occipital bone



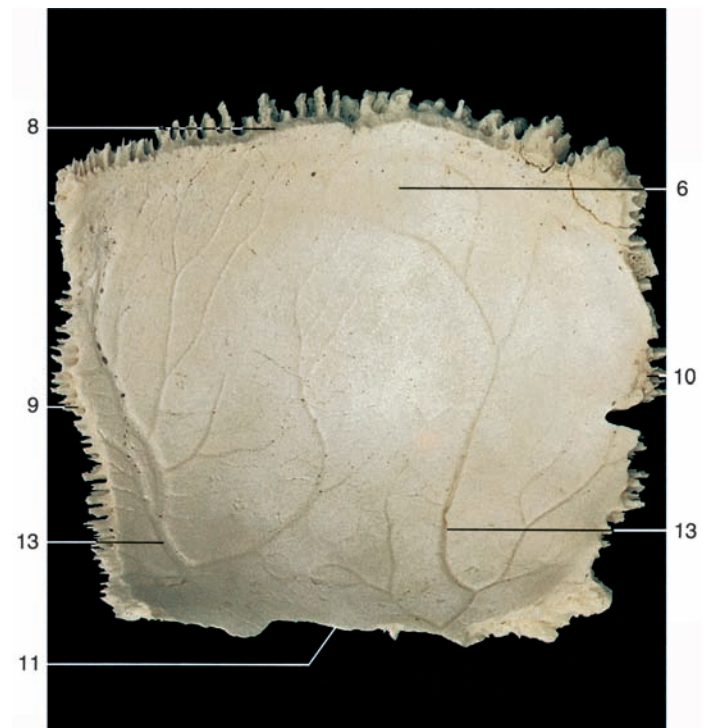
Calvaria (superior aspect).



Calvaria (posterior aspect).

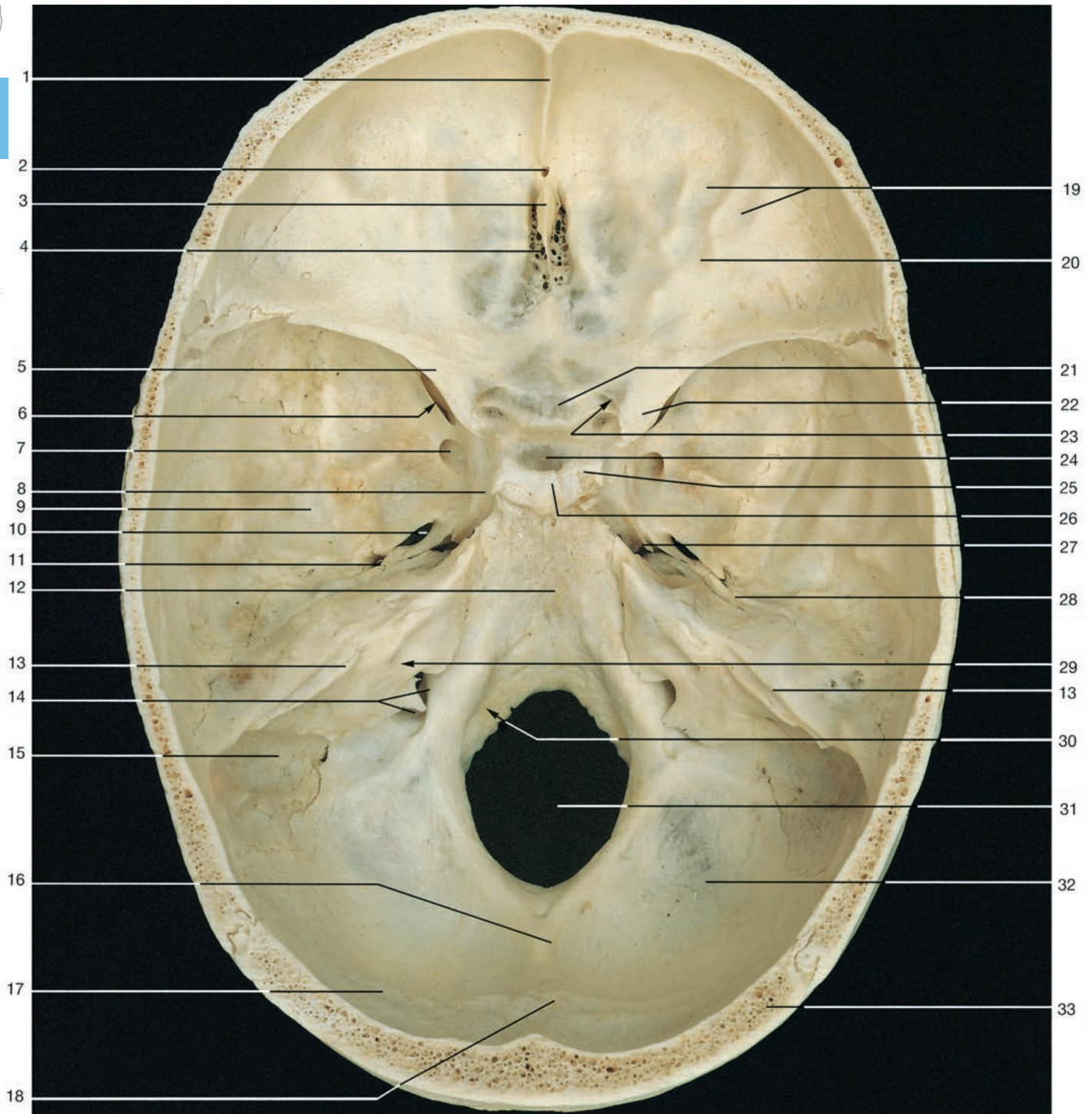


Left parietal bone (external aspect).



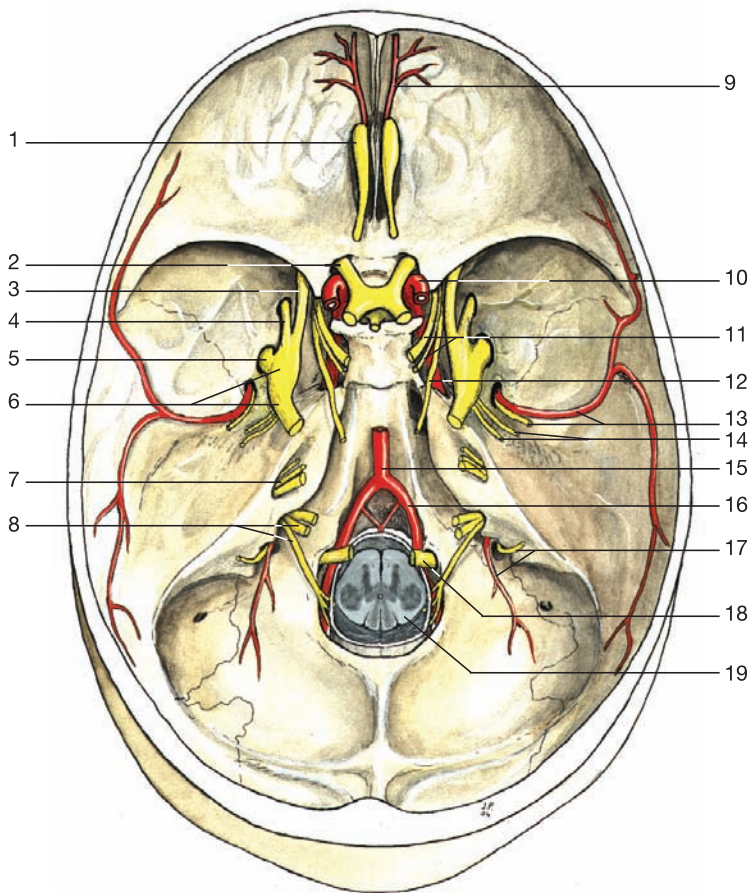
Left parietal bone (internal aspect).

- | | | |
|------------------------------|---------------------------------------|------------------------------------|
| 1 Frontal bone | 8 Sagittal margin | 15 Occipital bone |
| 2 Coronal suture | 9 Occipital margin | 16 External occipital protuberance |
| 3 Sagittal suture | 10 Frontal margin | 17 Inferior nuchal line |
| 4 Parietal bone | 11 Squamous margin | 18 Occipitomastoid suture |
| 5 Superior temporal line | 12 Sphenoidal angle | 19 Temporal bone |
| 6 Parietal foramen | 13 Groove for middle meningeal artery | 20 Mastoid process |
| 7 Parietal tuber or eminence | | 21 Mastoid notch |



Base of the skull, calvaria removed (internal aspect).

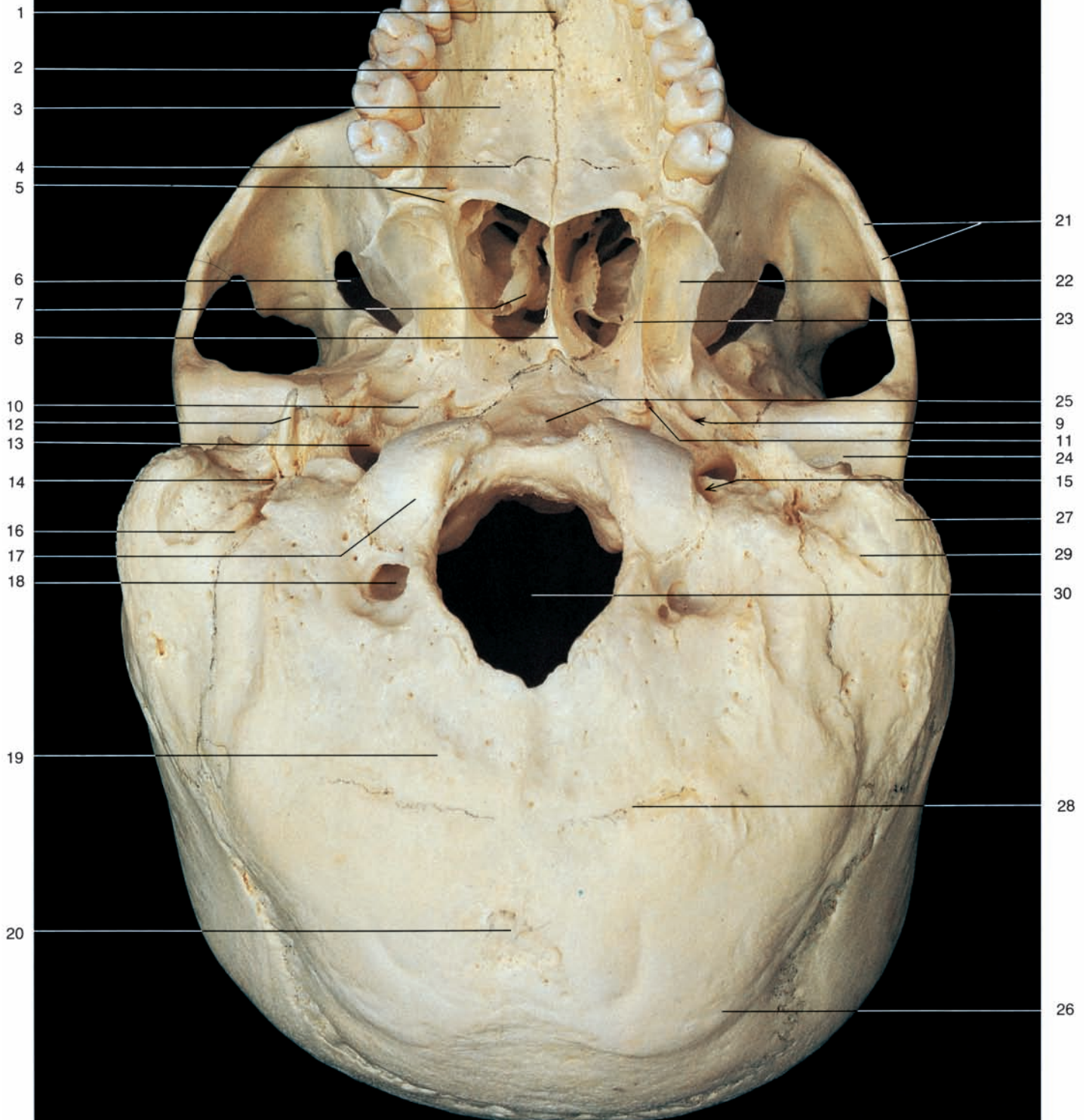
- | | | |
|--------------------------------------|---------------------------------------|--------------------------------------|
| 1 Frontal crest | 12 Clivus | 23 Optic canal |
| 2 Foramen cecum | 13 Groove for superior petrosal sinus | 24 Sella turcica (hypophysial fossa) |
| 3 Crista galli | 14 Jugular foramen | 25 Posterior clinoid process |
| 4 Cribriform plate of ethmoidal bone | 15 Groove for sigmoid sinus | 26 Dorsum sellae |
| 5 Lesser wing of sphenoidal bone | 16 Internal occipital crest | 27 Foramen lacerum |
| 6 Superior orbital fissure | 17 Groove for transverse sinus | 28 Groove for greater petrosal nerve |
| 7 Foramen rotundum | 18 Internal occipital protuberance | 29 Internal acoustic meatus |
| 8 Carotid sulcus | 19 Digitate impressions | 30 Hypoglossal canal |
| 9 Middle cranial fossa | 20 Anterior cranial fossa | 31 Foramen magnum |
| 10 Foramen ovale | 21 Chiasmatic sulcus | 32 Posterior cranial fossa |
| 11 Foramen spinosum | 22 Anterior clinoid process | 33 Diploe |



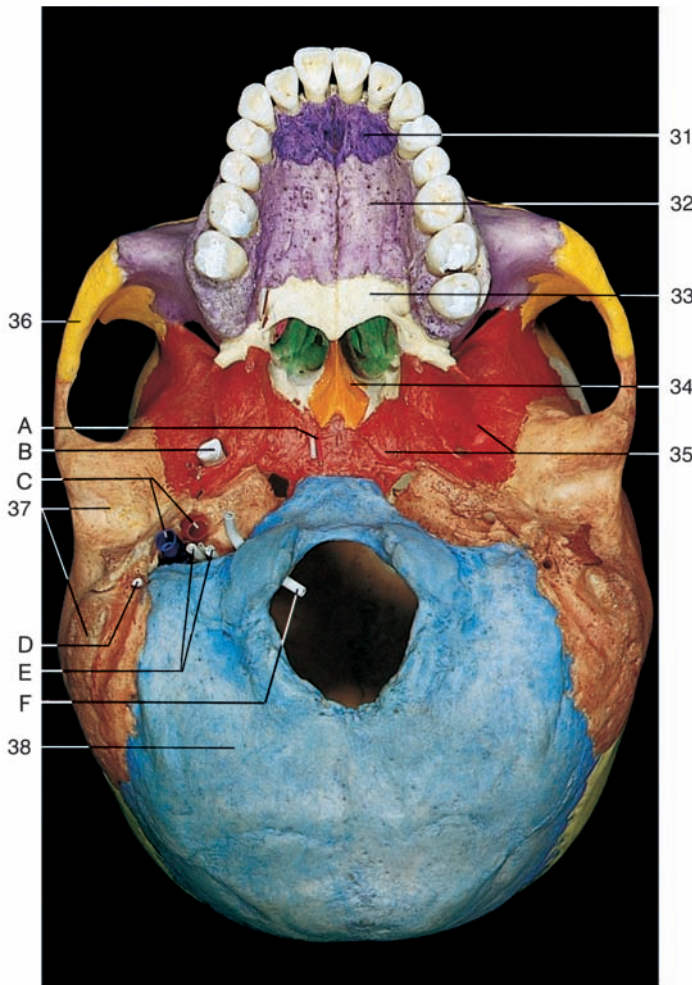
- 1 Olfactory bulb
- 2 Optic nerve (n. II)
- 3 Ophthalmic nerve (n. V₁)
- 4 Maxillary nerve (n. V₂)
- 5 Mandibular nerve (n. V₃)
- 6 Trigeminal nerve (n. V) with trigeminal ganglion
- 7 Facial nerve (n. VII) and vestibulocochlear nerve (n. VIII)
- 8 Glossopharyngeal nerve (n. IX), vagus nerve (n. X) and accessory nerve (n. XI)
- 9 Anterior meningeal artery
- 10 Internal carotid artery
- 11 Oculomotor nerve (n. III) and trochlear nerve (n. IV)
- 12 Abducent nerve (n. VI)
- 13 Middle meningeal artery and meningeal branch of mandibular nerve
- 14 Greater and lesser petrosal nerves
- 15 Basilar artery
- 16 Vertebral artery
- 17 Posterior meningeal artery and recurrent meningeal nerve
- 18 Hypoglossal nerve (n. XII)
- 19 Medulla oblongata

Base of the skull with cranial nerves and meningeal arteries (internal aspect).

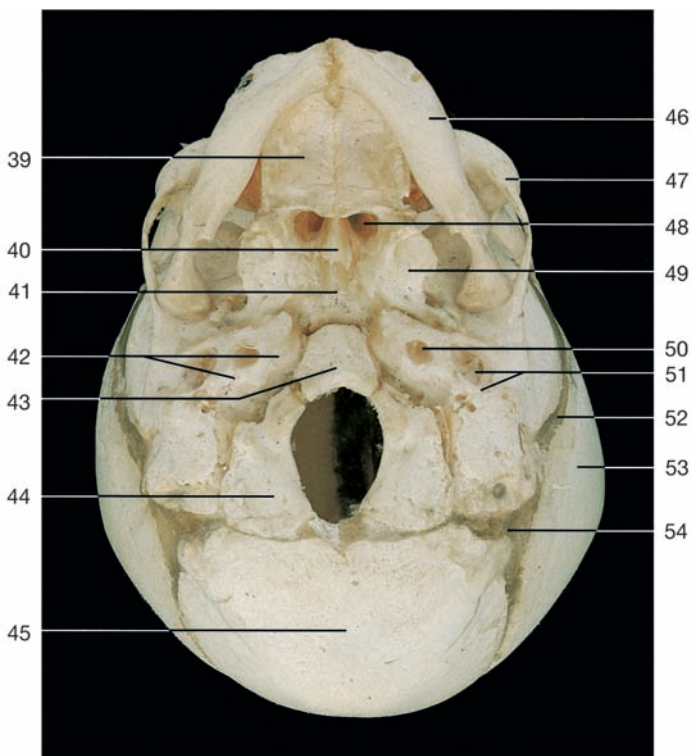
	Cranial nerves and vessels	Related foramina	Related regions
Anterior cranial fossa	Olfactory nerves (n. I), Anterior ethmoidal artery, vein, and nerve, Anterior meningeal artery	Lamina cribrosa	Nasal cavity
Middle cranial fossa	Optic nerve (n. II), Ophthalmic artery	Optic canal	Orbit
	Oculomotor nerve (n. III), Trochlear nerve (n. IV), Abducent nerve (n. VI), Ophthalmic nerve (n. V ₁), Superior ophthalmic vein	Superior orbital fissure	Orbit
	Maxillary nerve (n. V ₂)	Foramen rotundum	Pterygopalatine fossa
	Mandibular nerve (n. V ₃)	Foramen ovale	Infratemporal fossa
	Middle meningeal artery, Meningeal branch of mandibular nerve (n. V ₃)	Foramen spinosum	Infratemporal fossa
	Internal carotid artery	Carotid canal	Cavernous sinus, Base of skull
Posterior cranial fossa	Facial nerve (n. VII), Vestibulocochlear nerve (n. VIII), Artery and vein of the labyrinth	Internal acoustic meatus, Stylomastoid foramen, Facial canal	Inner ear, Face
	Glossopharyngeal nerve (n. IX), Vagus nerve (n. X), Accessory nerve (n. XI), Internal jugular vein, Posterior meningeal artery	Jugular foramen	Parapharyngeal region
	Hypoglossal nerve (n. XII)	Hypoglossal canal	Tongue
	Accessory nerve (n. XI, spinal root), Vertebral arteries, Anterior and posterior spinal arteries, Medulla oblongata	Foramen magnum	Base of skull



Base of the skull (inferior aspect).



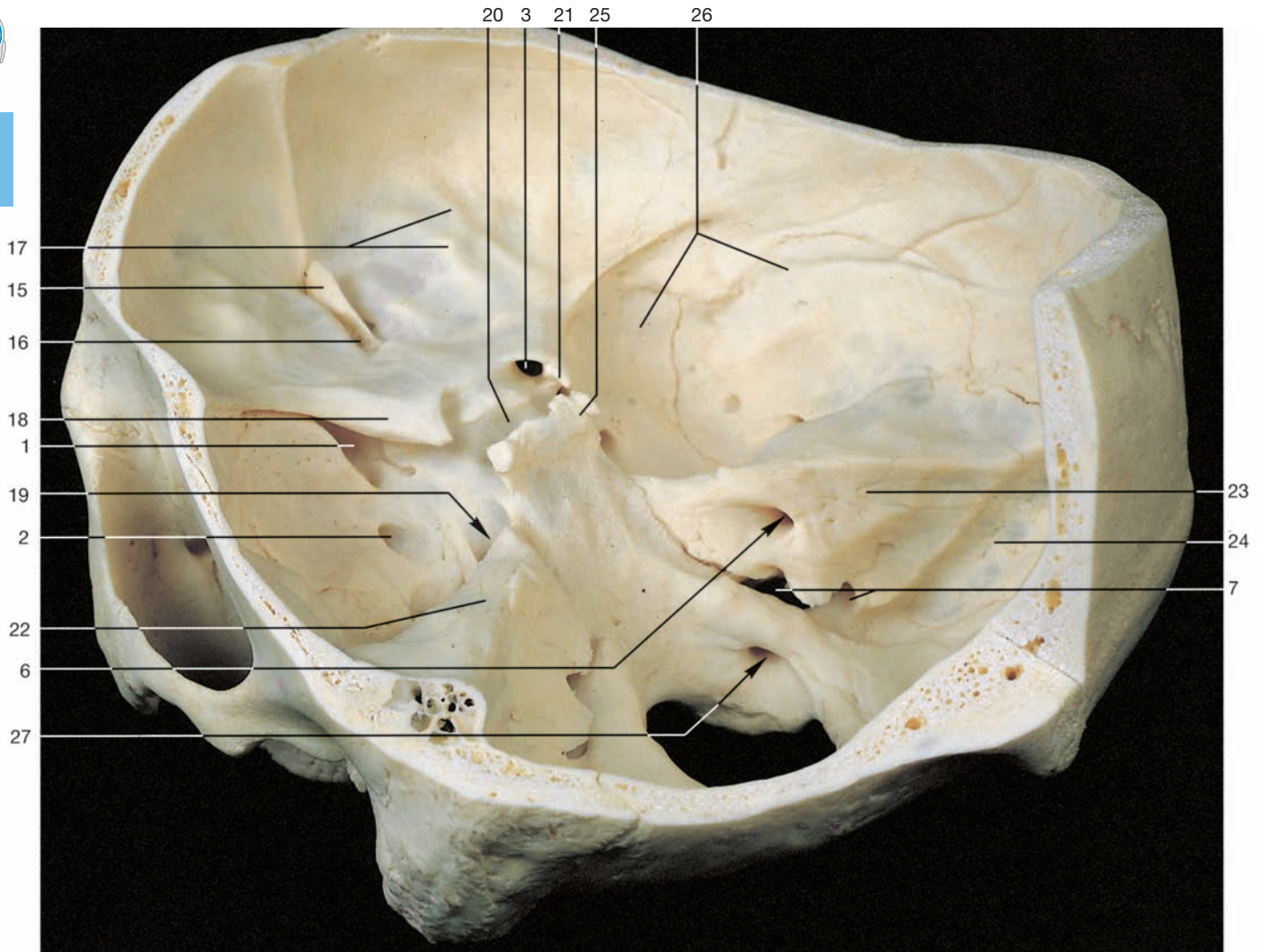
Base of the skull (from below). The individual bones are indicated by different colors.



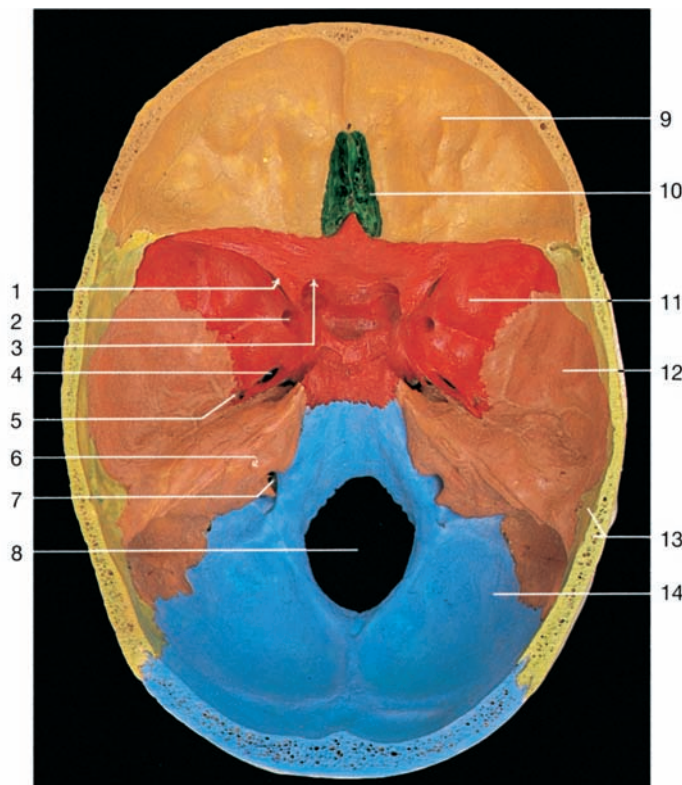
Skull of the newborn (inferior aspect).

- A = **Pterygoid canal**
 B = **Foramen ovale**
 C = Internal carotid artery within **carotid canal** and internal jugular vein within the venous part of jugular foramen
 D = **Stylomastoid foramen** (facial nerve)
 E = **Jugular foramen** (glossopharyngeal, vagus and accessory nerves)
 F = **Hypoglossal canal** (hypoglossal nerve)

- 1 Incisive canal
- 2 Median palatine suture
- 3 Palatine process of maxilla
- 4 Palatamaxillary suture
- 5 Greater and lesser palatine foramina
- 6 Inferior orbital fissure
- 7 Middle concha (process of ethmoidal bone)
- 8 Vomer
- 9 Foramen ovale
- 10 Groove for auditory tube
- 11 Pterygoid canal
- 12 Styloid process
- 13 Carotid canal
- 14 Stylomastoid foramen
- 15 Jugular foramen
- 16 Groove for occipital artery
- 17 Occipital condyle
- 18 Condylar canal
- 19 Nuchal plane
- 20 External occipital protuberance
- 21 Zygomatic arch
- 22 Lateral pterygoid plate
- 23 Medial pterygoid plate
- 24 Mandibular fossa
- 25 Pharyngeal tubercle
- 26 Superior nuchal line
- 27 Mastoid process
- 28 Inferior nuchal line
- 29 Mastoid notch
- 30 Foramen magnum
- 31 Incisive bone or premaxilla (dark violet)
- 32 Maxilla (violet)
- 33 Palatine bone (white)
- 34 Vomer (orange)
- 35 Sphenoidal bone (red)
- 36 Zygomatic bone (yellow)
- 37 Temporal bone (brown)
- 38 Occipital bone (blue)
- 39 Palatine process of maxilla
- 40 Vomer
- 41 Sphenoidal bone
- 42 Petrous part of temporal bone
- 43 Basilar part
- 44 Lateral part
- 45 Squamous part
- 46 Mandible
- 47 Zygomatic arch
- 48 Choana
- 49 Pterygoid process of sphenoidal bone
- 50 Carotid canal
- 51 External acoustic meatus (tympanic anulus)
- 52 Sphenoidal fontanelle
- 53 Parietal bone
- 54 Mastoid fontanelle



Base of the skull (internal aspect, oblique-lateral view from left side).



Canals, fissures, and foramina of the base of the skull

- 1 Superior orbital fissure
- 2 Foramen rotundum
- 3 Optic canal
- 4 Foramen ovale
- 5 Foramen spinosum
- 6 Internal acoustic meatus
- 7 Jugular foramen
- 8 Foramen magnum

Bones

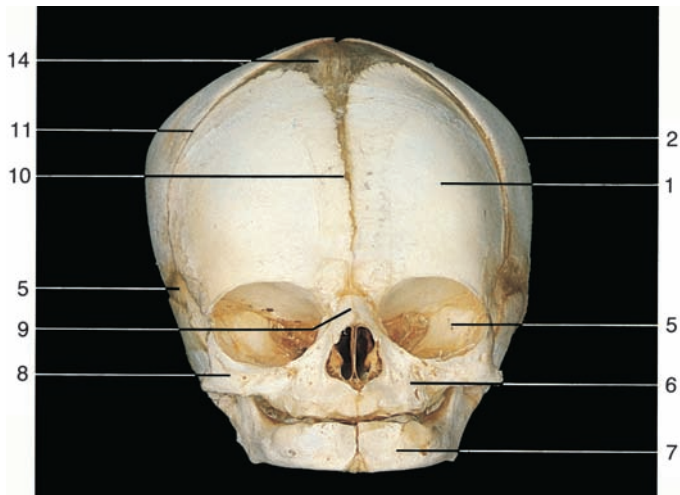
- 9 Frontal bone (orange)
- 10 Ethmoidal bone (dark green)
- 11 Sphenoidal bone (red)
- 12 Temporal bone (brown)
- 13 Parietal bone (yellow)
- 14 Occipital bone (blue)

Details of bones

- 15 Crista galli
- 16 Cribriform plate

- 17 Digitate impressions (frontal bone)
- 18 Lesser wing of sphenoidal bone
- 19 Foramen lacerum
- 20 Hypophysial fossa (sella turcica)
- 21 Anterior clinoid process
- 22 Trigeminal impression
- 23 Petrous part of temporal bone
- 24 Groove for sigmoid sinus
- 25 Dorsum sellae (posterior clinoid process)
- 26 Greater wing of sphenoidal bone, groove for middle meningeal artery
- 27 Hypoglossal canal

Base of the skull (internal aspect, superior view). The individual bones are indicated by different colors.



Skull of the newborn (anterior aspect).

Cranial skeleton

- 1 Frontal tuber or eminence
- 2 Parietal tuber or eminence
- 3 Occipital tuber or eminence
- 4 Squamous part of temporal bone
- 5 Greater wing of sphenoidal bone

Facial skeleton

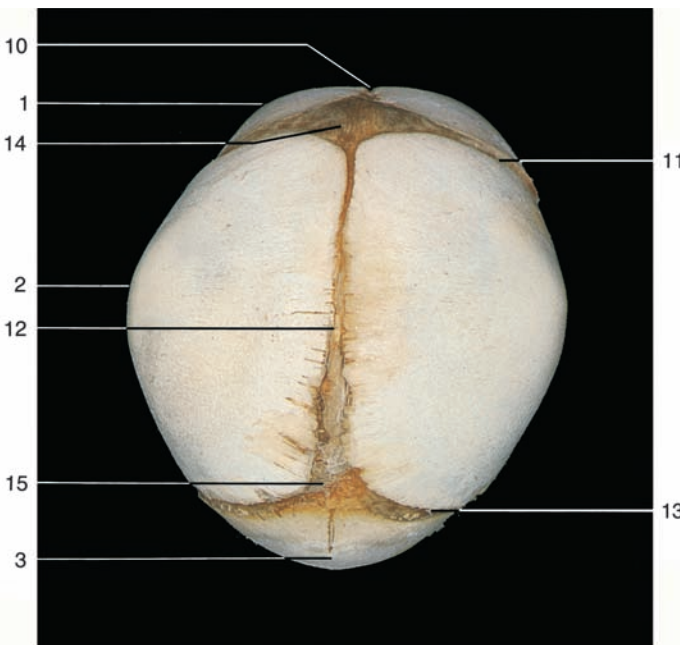
- 6 Maxilla
- 7 Mandible
- 8 Zygomatic bone
- 9 Nasal bone

Sutures and fontanelles

- 10 Frontal suture
- 11 Coronal suture
- 12 Sagittal suture
- 13 Lambdoid suture
- 14 Anterior fontanelle
- 15 Posterior fontanelle
- 16 Sphenoidal (anterolateral) fontanelle
- 17 Mastoid (posterolateral) fontanelle

Base of the skull

- 18 Frontal bone
- 19 Ethmoidal bone
- 20 Sphenoidal bone
- 21 Hypophysial fossa (sella turcica)
- 22 Dorsum sellae
- 23 Temporal bone
- 24 Mastoid (posterolateral) fontanelle
- 25 Occipital bone

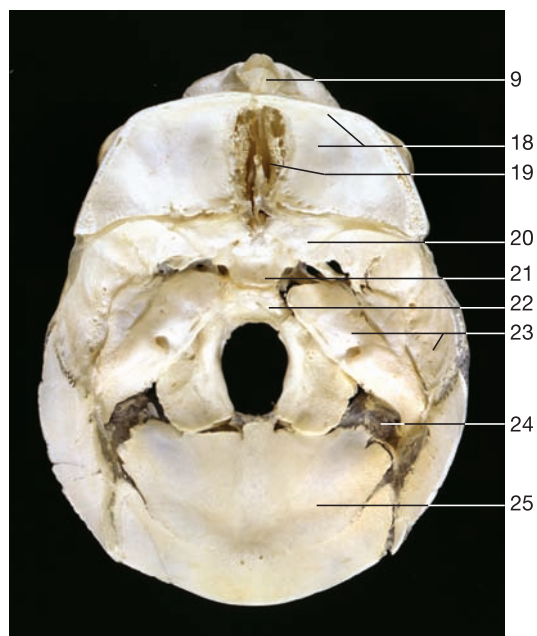


Skull of the newborn (superior aspect). Calvaria.

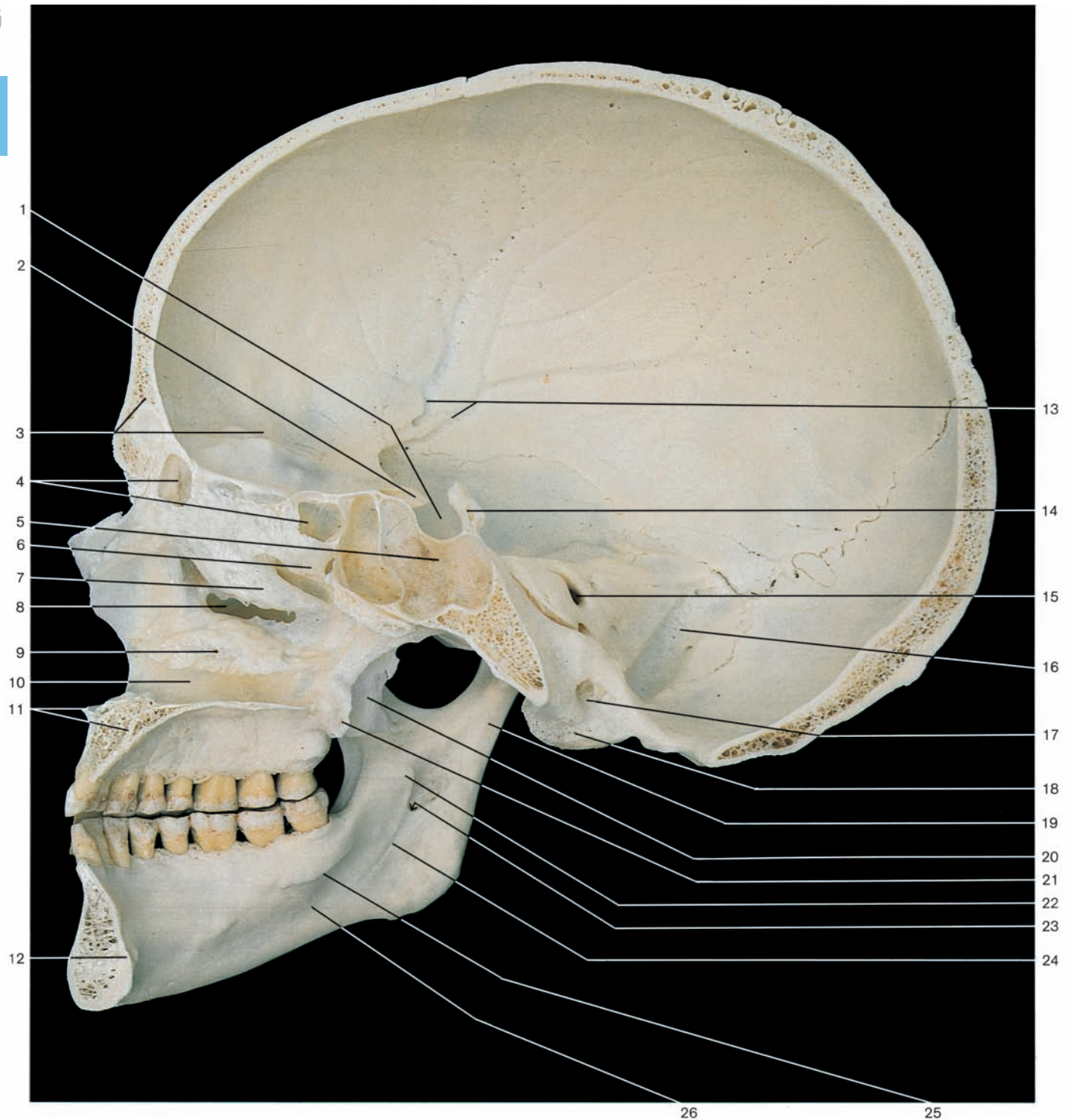
In the newborn, the facial skeleton, in contrast to the cranial skeleton, appears relatively small. There are no teeth presenting. The bones of the cranium are separated by wide fontanelles.



Skull of the newborn (lateral aspect).



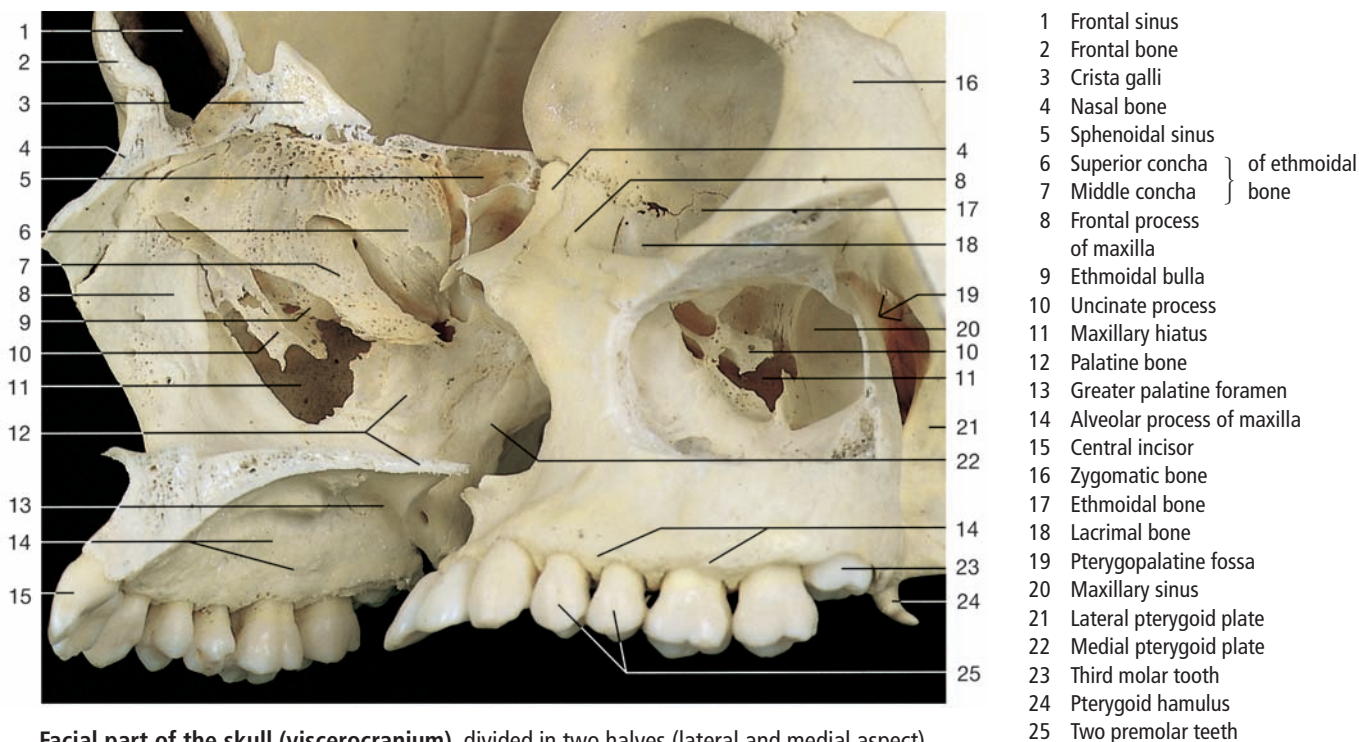
Base of the skull of the newborn (internal aspect).



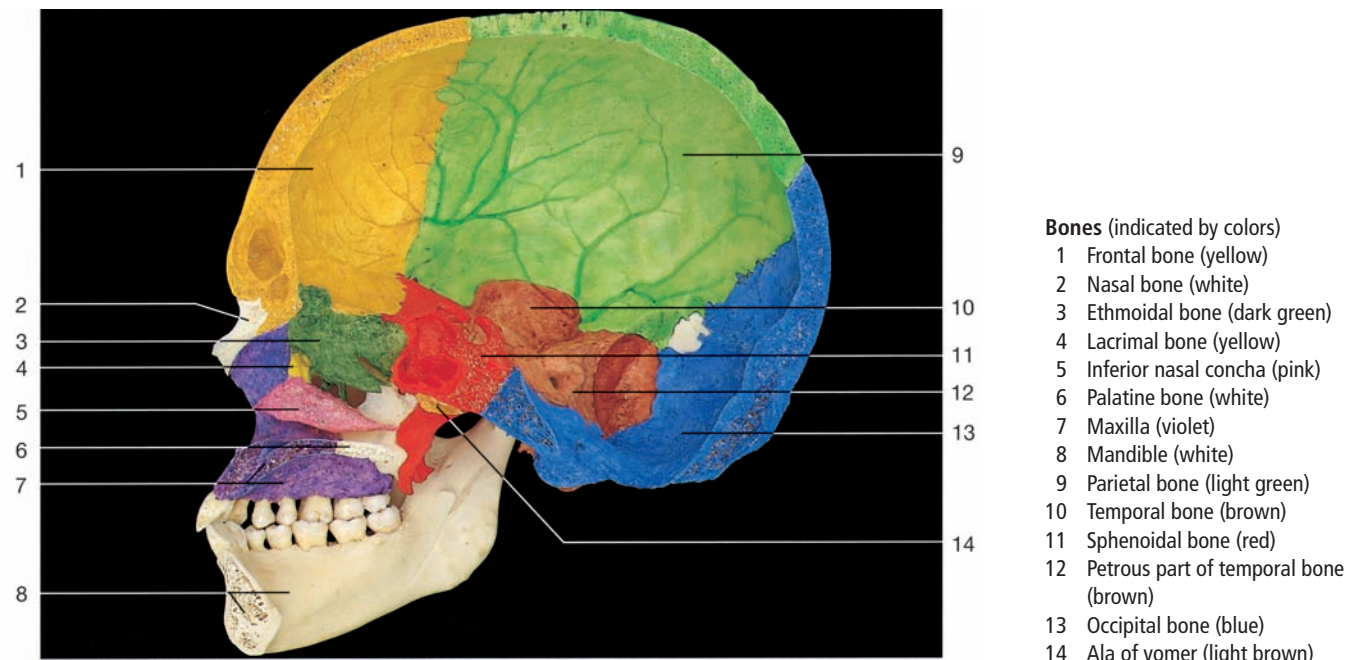
Median section through the skull, right half (internal aspect).

- 1 Hypophysial fossa (sella turcica)
- 2 Anterior clinoid process
- 3 Frontal bone
- 4 Ethmoidal air cells
- 5 Sphenoidal sinus
- 6 Superior concha
- 7 Middle concha
- 8 Maxillary hiatus
- 9 Inferior concha
- 10 Inferior meatus
- 11 Anterior nasal spine and maxilla
- 12 Mental spine or genial tubercle
- 13 Groove for middle meningeal artery

- 14 Dorsum sellae
 - 15 Internal acoustic meatus
 - 16 Groove for sigmoid sinus
 - 17 Hypoglossal canal
 - 18 Occipital condyle
 - 19 Condylar process
 - 20 Lateral pterygoid plate
 - 21 Medial pterygoid plate
 - 22 Lingula of mandible
 - 23 Mandibular foramen
 - 24 Mylohyoid groove
 - 25 Mylohyoid line
 - 26 Submandibular fovea
- } of pterygoid process

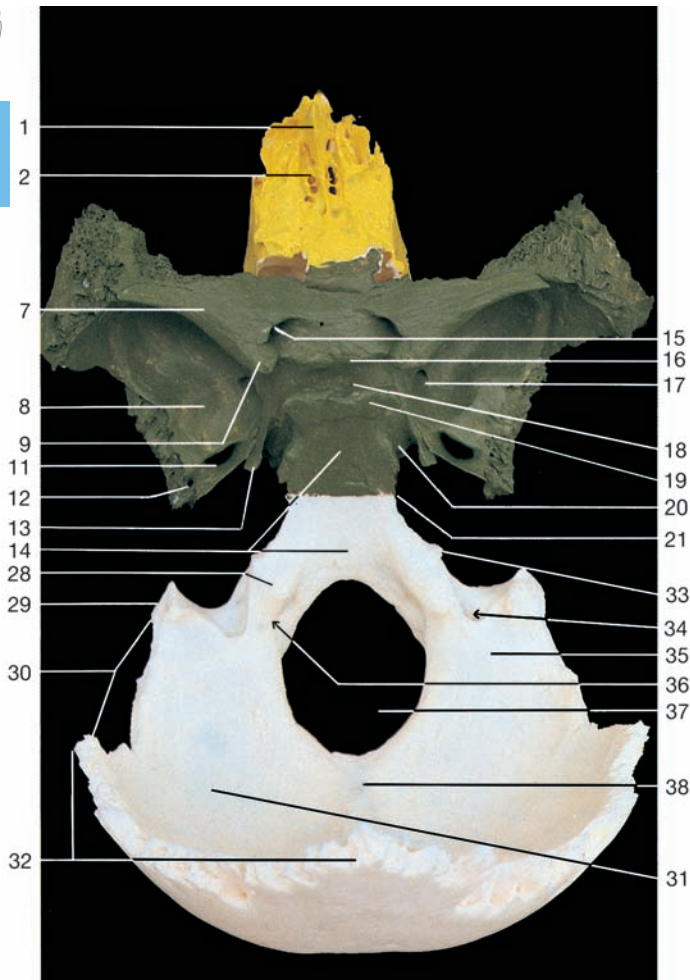


Facial part of the skull (viscerocranium), divided in two halves (lateral and medial aspect). Right inferior concha has been removed to show the maxillary hiatus. Left maxillary sinus opened.



Median section through the skull. The nasal septum has been removed. The individual bones are indicated by different colors.

Because of the upright posture that the human developed in the course of evolution, the cranial cavity greatly increased in size, whereas the facial skeleton decreased. As a result, the base of the skull developed an angulation of about 120° between the clivus and the cribriform plate (see drawing on page 20). The hypophysial fossa containing the pituitary gland lies at the angle formed between these two planes.



Ethmoidal bone

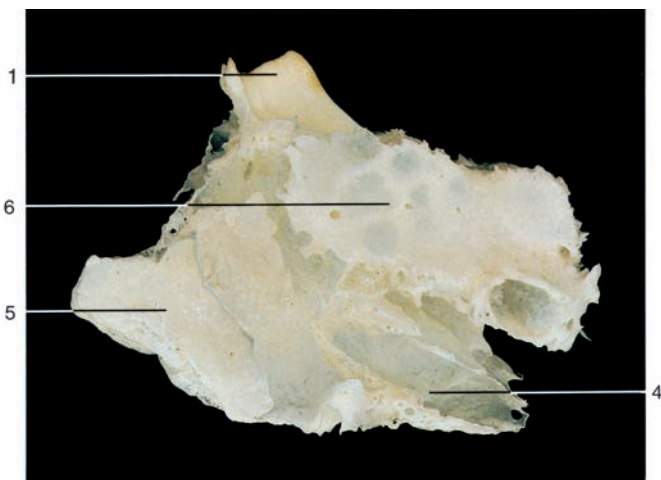
- 1 Crista galli
- 2 Cribriform plate
- 3 Ethmoidal air cells
- 4 Middle concha
- 5 Perpendicular plate (part of nasal septum)
- 6 Orbital plate

Sphenoidal bone

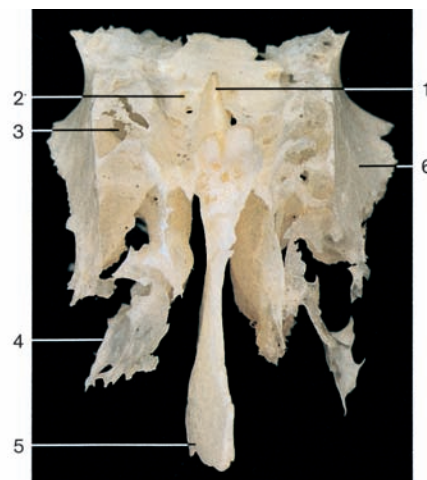
- 7 Lesser wing
- 8 Greater wing
- 9 Anterior clinoid process
- 10 Posterior clinoid process
- 11 Foramen ovale
- 12 Foramen spinosum
- 13 Lingula of the sphenoidal bone
- 14 Clivus
- 15 Optic canal
- 16 Tuberculum sellae
- 17 Foramen rotundum (right side)
- 18 Hypophysial fossa (sella turcica)
- 19 Dorsum sellae
- 20 Carotid sulcus
- 21 Spheno-occipital synchondrosis
- 22 Lateral pterygoid plate
- 23 Greater wing of sphenoidal bone (orbital surface)
- 24 Greater wing of sphenoidal bone (maxillary surface)
- 25 Foramen rotundum (left side)
- 26 Superior orbital fissure
- 27 Infratemporal crest of the greater wing

Part of a disarticulated base of the skull.

Ethmoidal, sphenoidal, and occipital bones (from above).
Green = sphenoidal bone; yellow = ethmoidal bone.



Ethmoidal bone (lateral aspect), posterior portion to the right.



Ethmoidal bone (anterior aspect).

**Occipital bone**

- 28 Jugular tubercle
- 29 Jugular process
- 30 Mastoid margin
- 31 Posterior cranial fossa
- 32 Lambdoid margin
- 33 Intrajugular process
- 34 Condylar canal
- 35 Lateral part of occipital bone
- 36 Hypoglossal canal
- 37 Foramen magnum
- 38 Internal occipital crest
- 39 Squamous part of occipital bone
- 40 Internal occipital protuberance

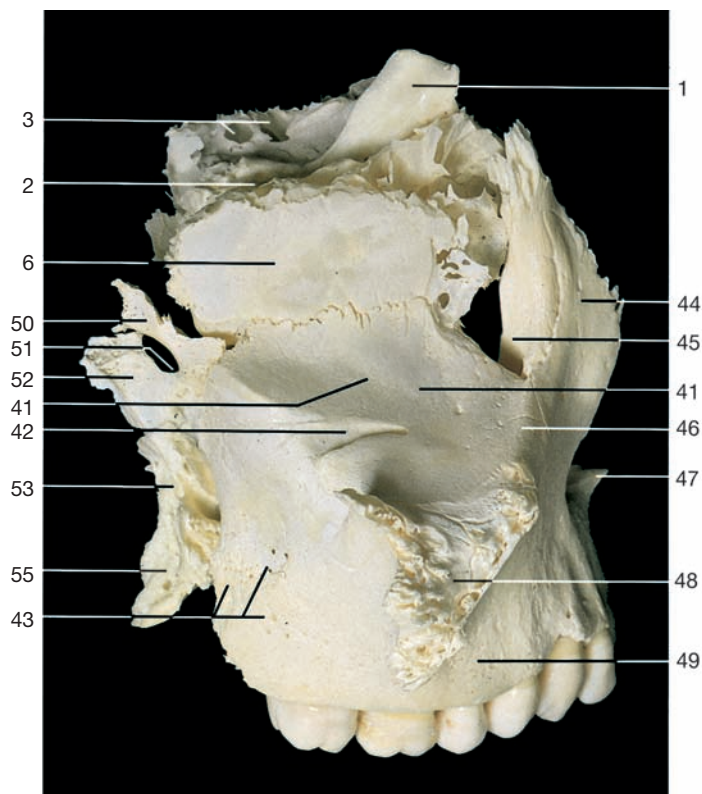
Maxilla

- 41 Orbital surface
- 42 Infra-orbital groove
- 43 Maxillary tuberosity with foramina
- 44 Frontal process
- 45 Nasolacrimal groove
- 46 Infra-orbital margin
- 47 Anterior nasal spine
- 48 Zygomatic process
- 49 Alveolar process

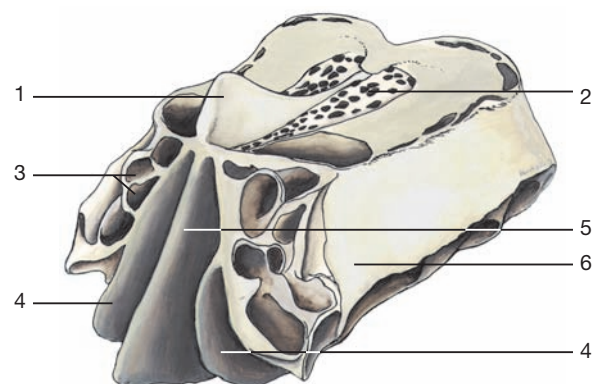
Palatine bone

- 50 Orbital process
- 51 Sphenopalatine notch
- 52 Sphenoidal process
- 53 Perpendicular plate
- 54 Horizontal plate
- 55 Pyramidal process

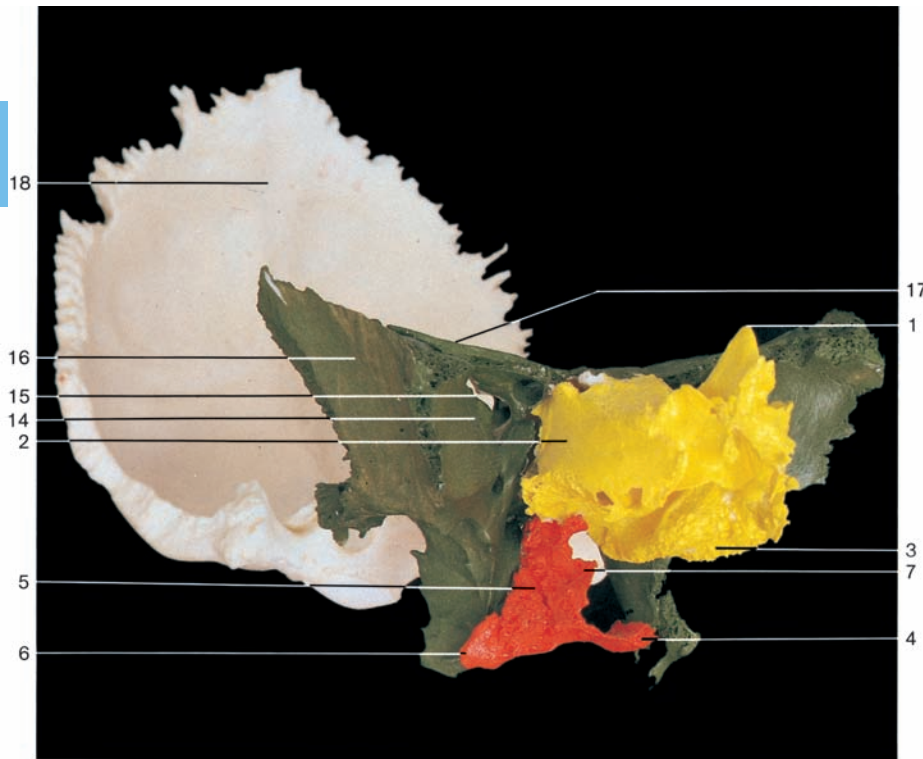
Part of a disarticulated base of the skull (anterior aspect). Green = sphenoidal bone; yellow = ethmoidal bone; red = palatine bone.



Right maxilla, ethmoidal, and palatine bones (lateral aspect).



Ethmoidal bone (oblique-anterior aspect).



Ethmoidal bone

- 1 Crista galli
- 2 Orbital plate
- 3 Middle concha

Palatine bone

- 4 Horizontal plate of palatine bone
- 5 Greater palatine canal
- 6 Pyramidal process
- 7 Maxillary process
- 8 Orbital process
- 9 Sphenopalatine notch
- 10 Perpendicular plate of palatine bone
- 11 Conchal crest
- 12 Nasal crest
- 13 Sphenoidal process

Sphenoidal bone

- 14 Greater wing
- 15 Superior orbital fissure
- 16 Greater wing (orbital surface)
- 17 Lesser wing

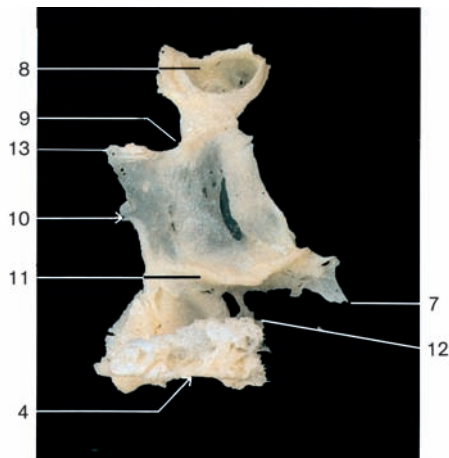
Occipital bone

- 18 Squamous part of occipital bone

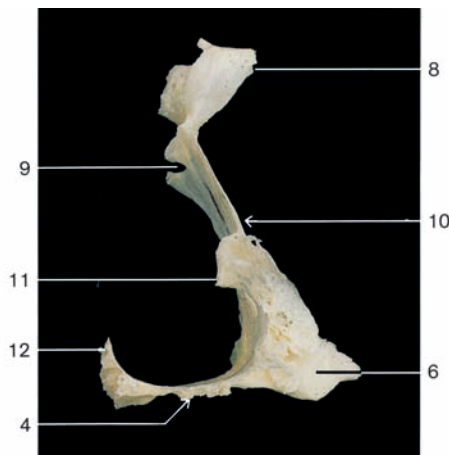
Maxilla

- 19 Maxillary tuberosity
- 20 Frontal process
- 21 Orbital surface
- 22 Infra-orbital margin
- 23 Infra-orbital groove
- 24 Zygomatic process
- 25 Alveolar process

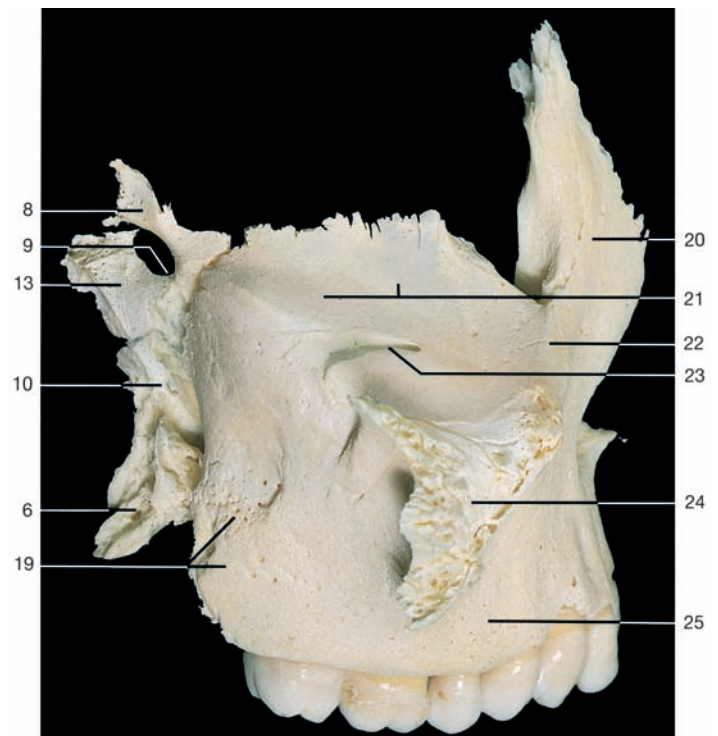
Part of a disarticulated base of the skull, similar to the preceding figures, but with palatine bone. Green = sphenoidal bone; yellow = ethmoidal bone; red = palatine bone.



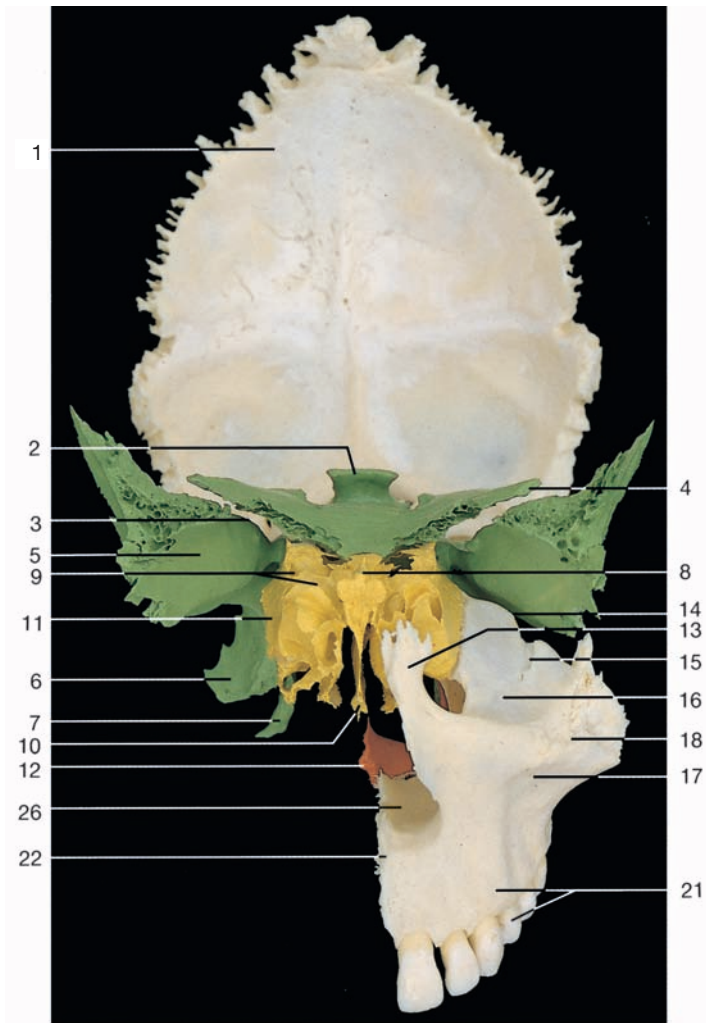
Left palatine bone (medial aspect, posterior aspect to the left).



Left palatine bone (anterior aspect).



Right maxilla and palatine bone (lateral aspect).

**Occipital bone**

- 1 Squamous part

Sphenoidal bone

- 2 Dorsum sellae
- 3 Superior orbital fissure
- 4 Lesser wing
- 5 Greater wing (orbital surface)
- 6 Lateral pterygoid plate
- 7 Medial pterygoid plate

Ethmoidal bone

- 8 Crista galli
- 9 Ethmoidal air cells
- 10 Perpendicular plate
- 11 Orbital plate

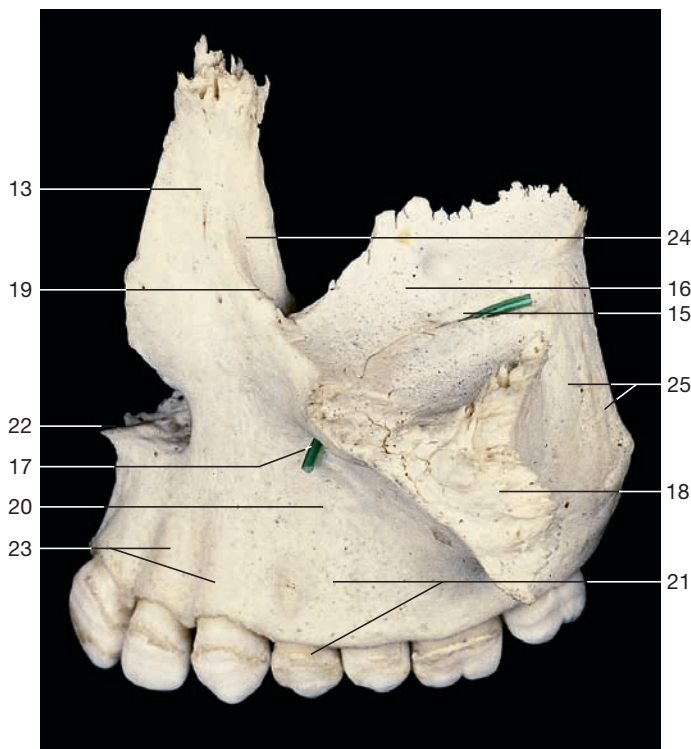
Palatine bone

- 12 Horizontal plate (nasal crest)

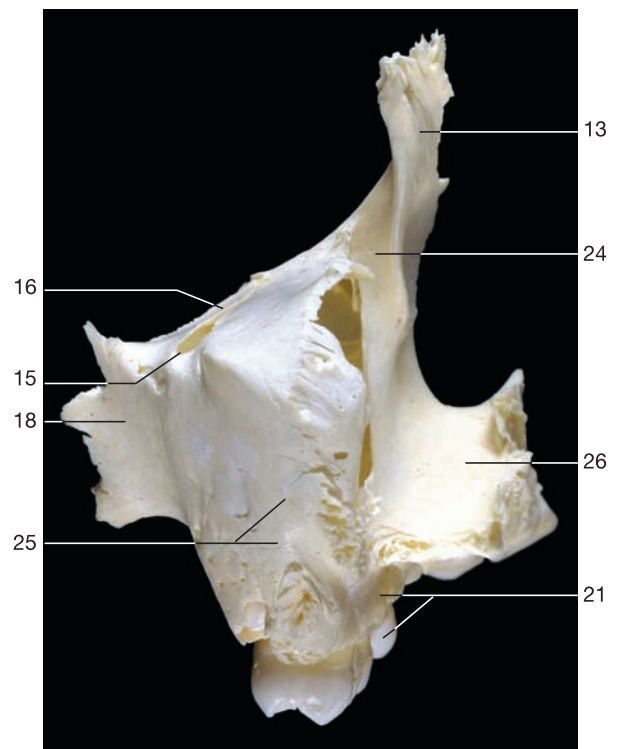
Maxilla

- 13 Frontal process
- 14 Inferior orbital fissure
- 15 Infra-orbital groove
- 16 Orbital surface
- 17 Infra-orbital foramen
- 18 Zygomatic process
- 19 Anterior lacrimal crest
- 20 Canine fossa
- 21 Alveolar process with teeth
- 22 Anterior nasal spine
- 23 Juga alveolaria (elevations formed by roots of teeth)
- 24 Lacrimal groove
- 25 Maxillary tuberosity with alveolar foramina
- 26 Palatine process of maxilla

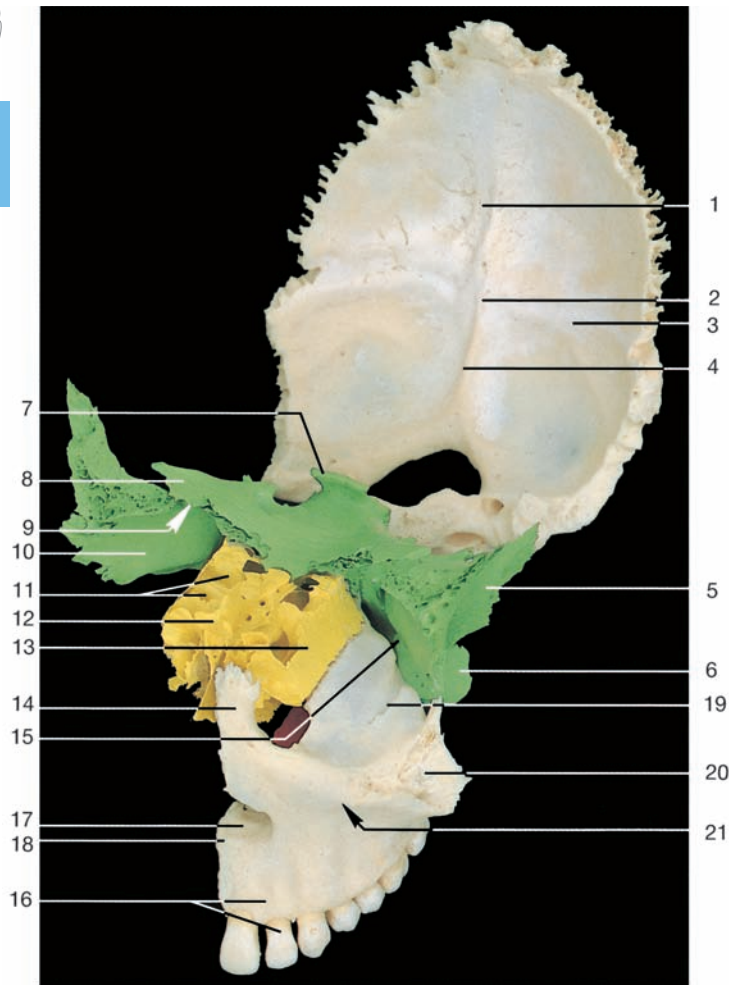
Part of a disarticulated base of the skull (anterior aspect).
The left maxilla is added to the preceding specimen.



Left maxilla (lateral aspect). Probe = infra-orbital canal.



Left maxilla (posterior aspect).



Part of a disarticulated base of the skull. The mosaic of the facial bones [sphenoidal bone (green), ethmoidal bone (yellow), and palatine bone (red)] is seen from the antero-lateral aspect.

Occipital bone

- 1 Groove for superior sagittal sinus
- 2 Internal occipital protuberance
- 3 Groove for transverse sinus
- 4 Internal occipital crest

Sphenoidal bone

- 5 Greater wing (temporal surface)
- 6 Lateral pterygoid plate
- 7 Dorsum sellae
- 8 Lesser wing
- 9 Superior orbital fissure
- 10 Greater wing (orbital surface)

Ethmoidal bone

- 11 Ethmoidal air cells
- 12 Crista galli
- 13 Orbital plate

Maxilla

- 14 Frontal process
- 15 Inferior orbital fissure
- 16 Alveolar process with teeth
- 17 Palatine process
- 18 Anterior nasal spine
- 19 Infra-orbital groove
- 20 Zygomatic process
- 21 Location of infra-orbital foramen
- 22 Middle nasal meatus
- 23 Inferior nasal meatus
- 24 Maxillary hiatus (leading to maxillary sinus)
- 25 Third molar
- 26 Lacrimal groove
- 27 Conchal crest
- 28 Body of maxilla (nasal surface)
- 29 Nasal crest
- 30 Incisive canal

Palatine bone

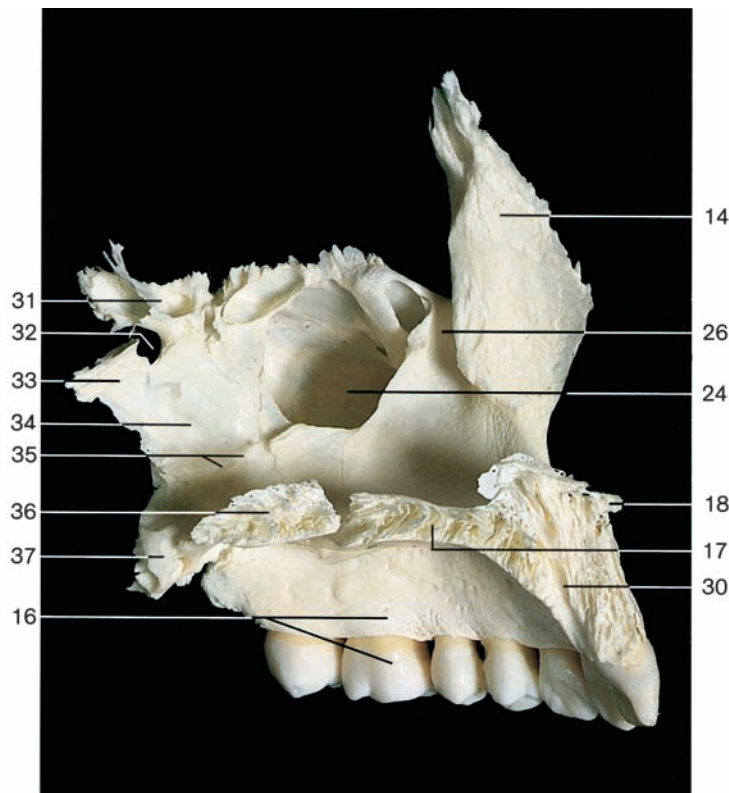
- 31 Orbital process
- 32 Sphenopalatine notch
- 33 Sphenoidal process
- 34 Perpendicular plate
- 35 Conchal crest
- 36 Horizontal plate
- 37 Pyramidal process

Frontal bone

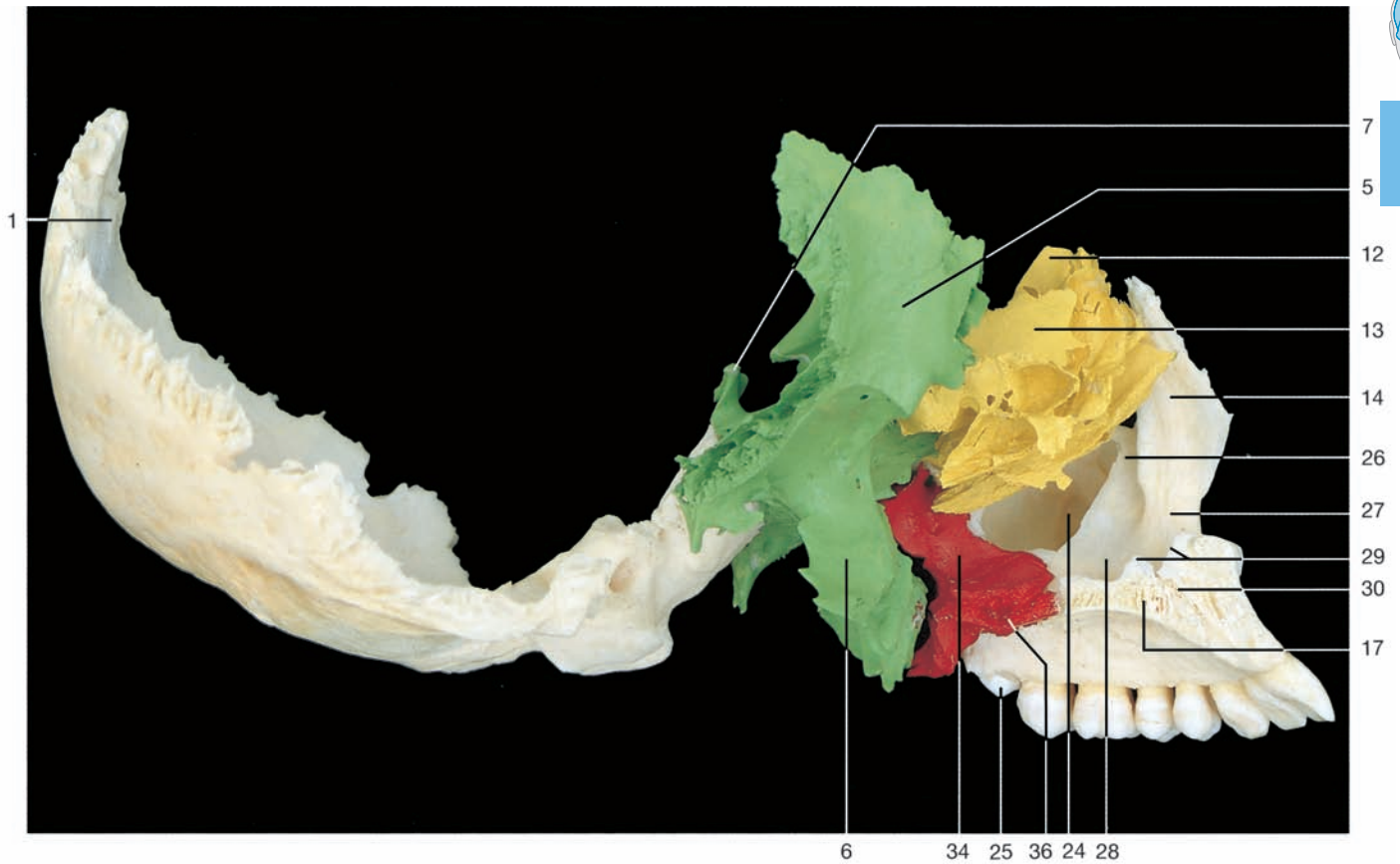
- 38 Squamous part
- 39 Supra-orbital foramen
- 40 Frontal notch
- 41 Frontal spine

Inferior nasal concha

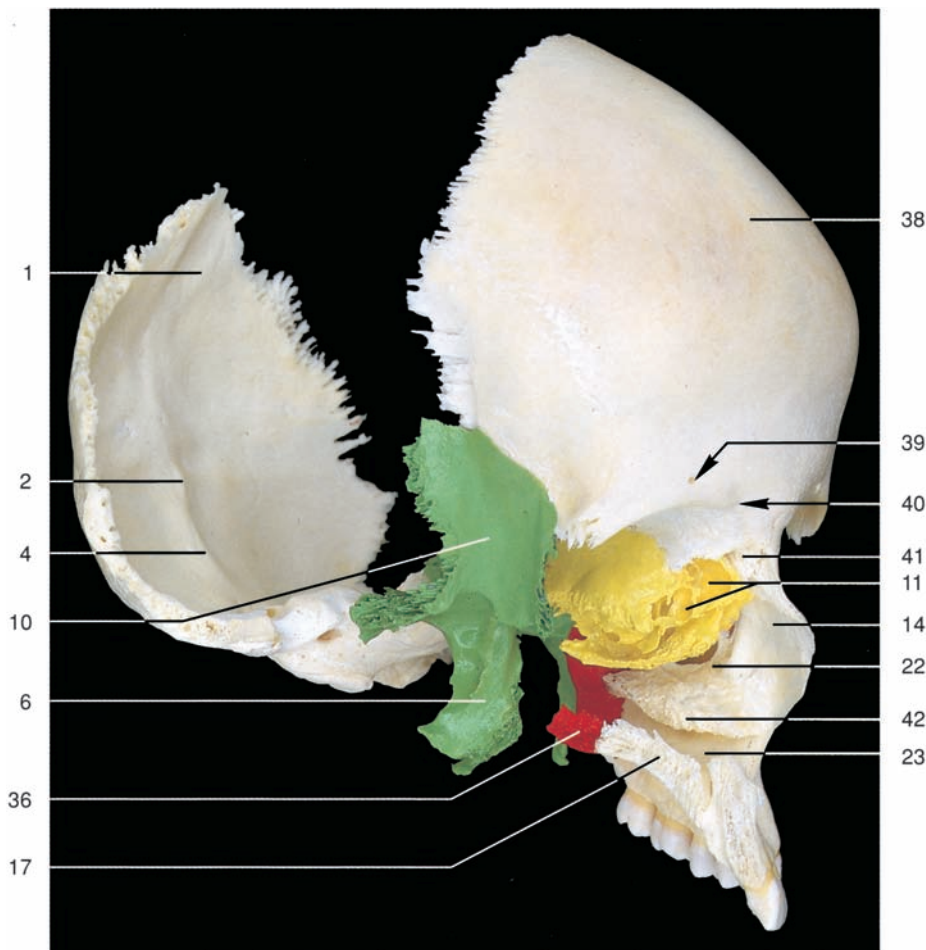
- 42 Inferior nasal concha with maxillary process



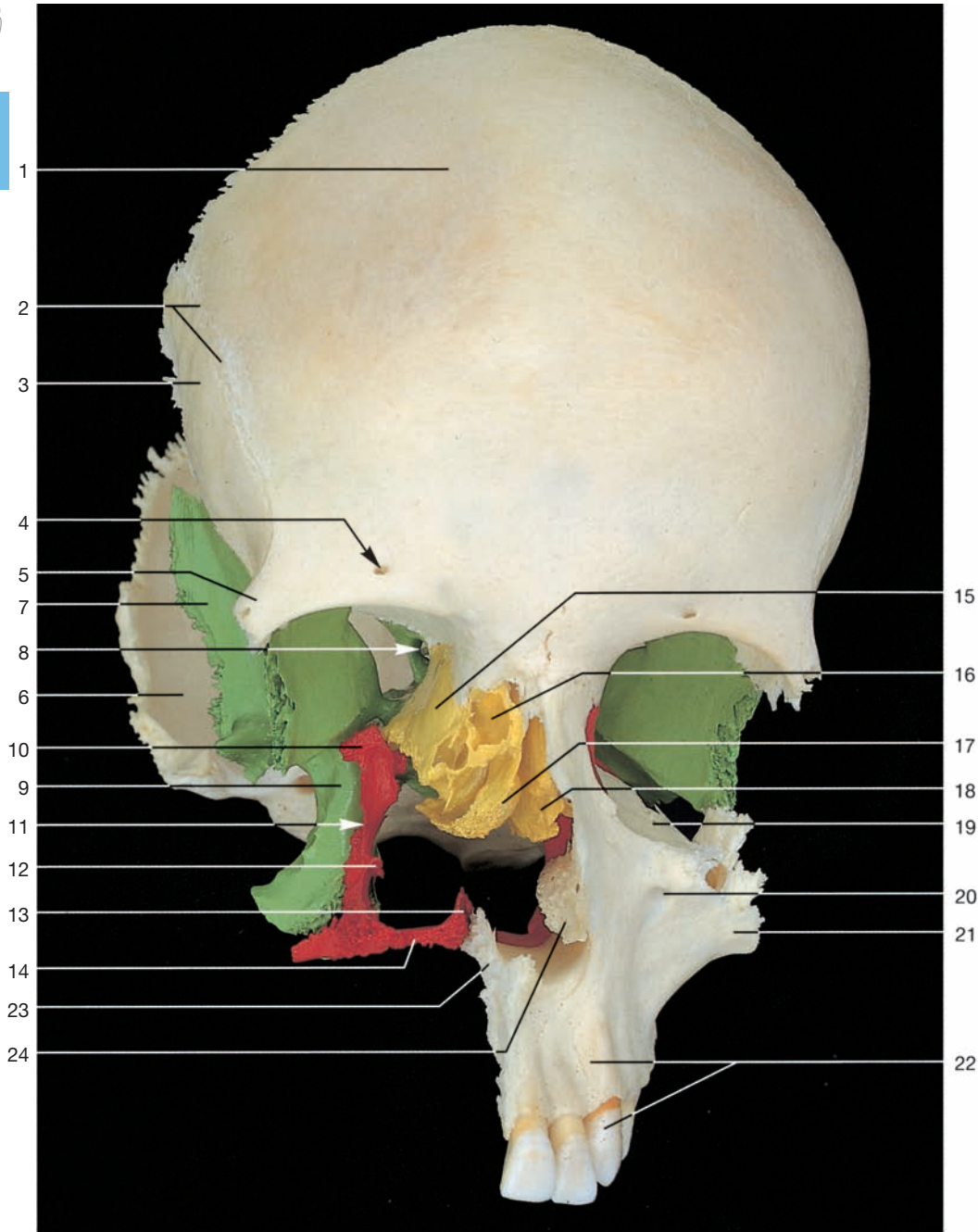
Left maxilla and palatine bone (medial aspect).



Part of a disarticulated base of the skull (medial aspect). Green = sphenoidal bone; yellow = ethmoidal bone; red = palatine bone; natural colored = left maxilla.



Part of a disarticulated base of the skull (oblique-lateral aspect). The same specimen as shown above but with frontal bone.



Part of a disarticulated skull showing the connection of the palatine bone (red) and the maxilla with ethmoidal bone (yellow) and sphenoidal bone (green) (anterior aspect).

- Frontal bone**

1 Squamous part

2 Inferior temporal line

3 Temporal surface

4 Supra-orbital foramen

5 Zygomatic process
- Occipital bone**

6 Squamous part
- Sphenoidal bone**

7 Greater wing (temporal surface)

8 Optic canal within the lesser wing

9 Lateral pterygoid plate
- Palatine bone**

10 Orbital process

11 Perpendicular plate

12 Conchal crest

13 Nasal crest

14 Horizontal plate
- Ethmoidal bone**

15 Orbital plate

16 Ethmoidal air cell

17 Middle concha

18 Perpendicular plate (part of bony nasal septum)
- Maxilla**

19 Infra-orbital groove

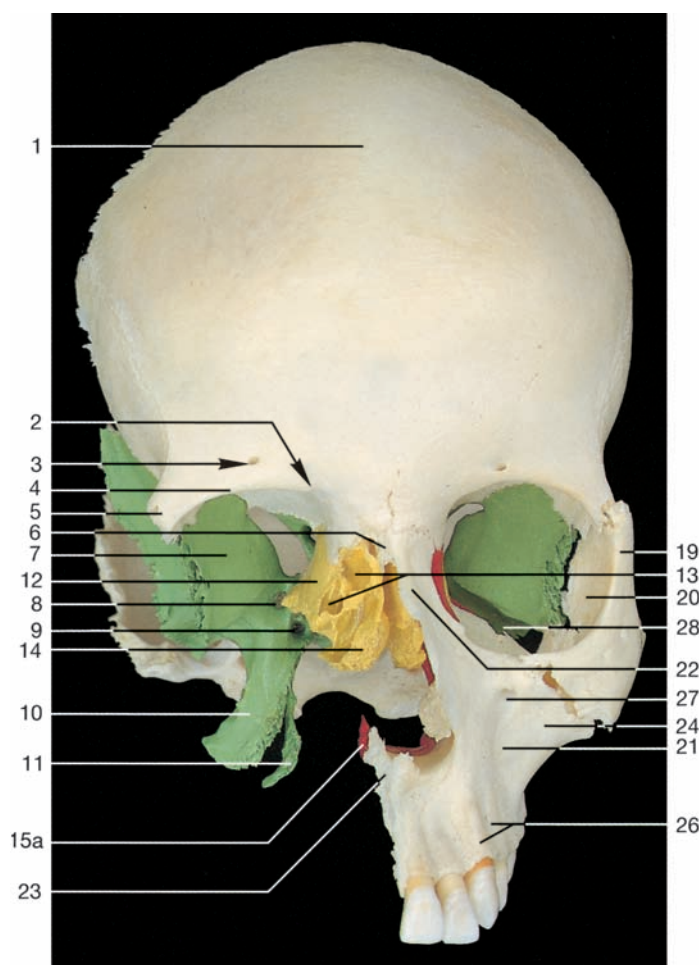
20 Infra-orbital foramen

21 Zygomatic process

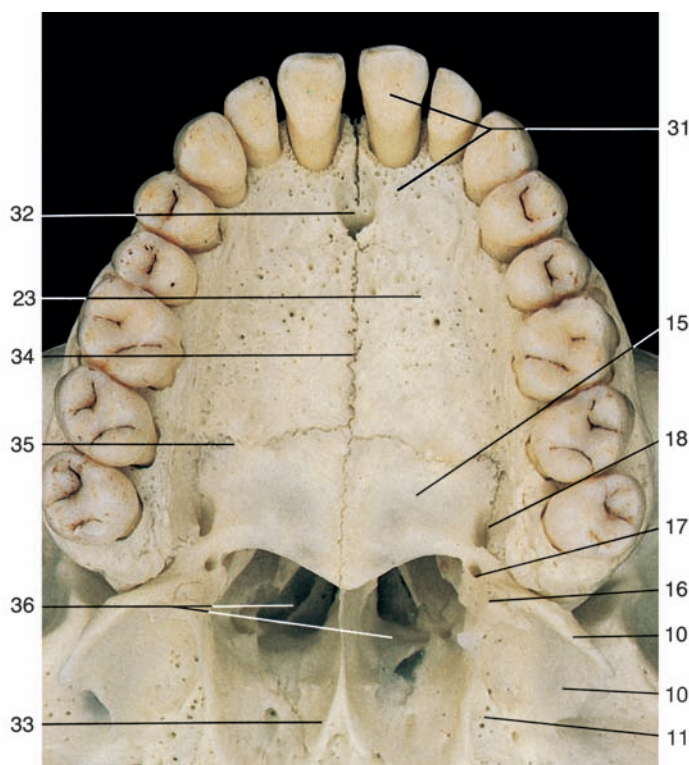
22 Alveolar process with teeth

23 Palatine process
- Left inferior nasal concha**

24 Anterior part of inferior concha



Part of a disarticulated skull showing the connection of the maxilla with the frontal and zygomatic bones (anterior aspect).
Yellow = ethmoidal bone; red = palatine bone; green = sphenoidal bone.



Bony palate and teeth of the maxillae (from below).

Frontal bone

- 1 Squamous part
- 2 Frontal notch
- 3 Supra-orbital foramen
- 4 Supra-orbital margin
- 5 Zygomatic process
- 6 Frontal spine

Sphenoidal bone

- 7 Greater wing (orbital surface)
- 8 Foramen rotundum
- 9 Pterygoid or Vidian canal
- 10 Lateral pterygoid plate
- 11 Medial pterygoid plate

Ethmoidal bone

- 12 Orbital plate
- 13 Ethmoidal air cells
- 14 Middle concha

Palatine bone

- 15 Horizontal plate
- 15a Nasal crest
- 16 Pyramidal process
- 17 Lesser palatine foramen
- 18 Greater palatine foramen

Zygomatic bone

- 19 Frontal process
- 20 Orbital surface

Maxilla

- 21 Canine fossa
- 22 Frontal process
- 23 Palatine process
- 24 Zygomatic process
- 25 Alveolar process and teeth
- 26 Juga alveolaria
- 27 Infra-orbital foramen
- 28 Infra-orbital groove
- 29 Anterior nasal aperture
- 30 Anterior nasal spine

Incisive bone

- 31 Central incisor and incisive bone or premaxilla
- 32 Incisive fossa

Vomer

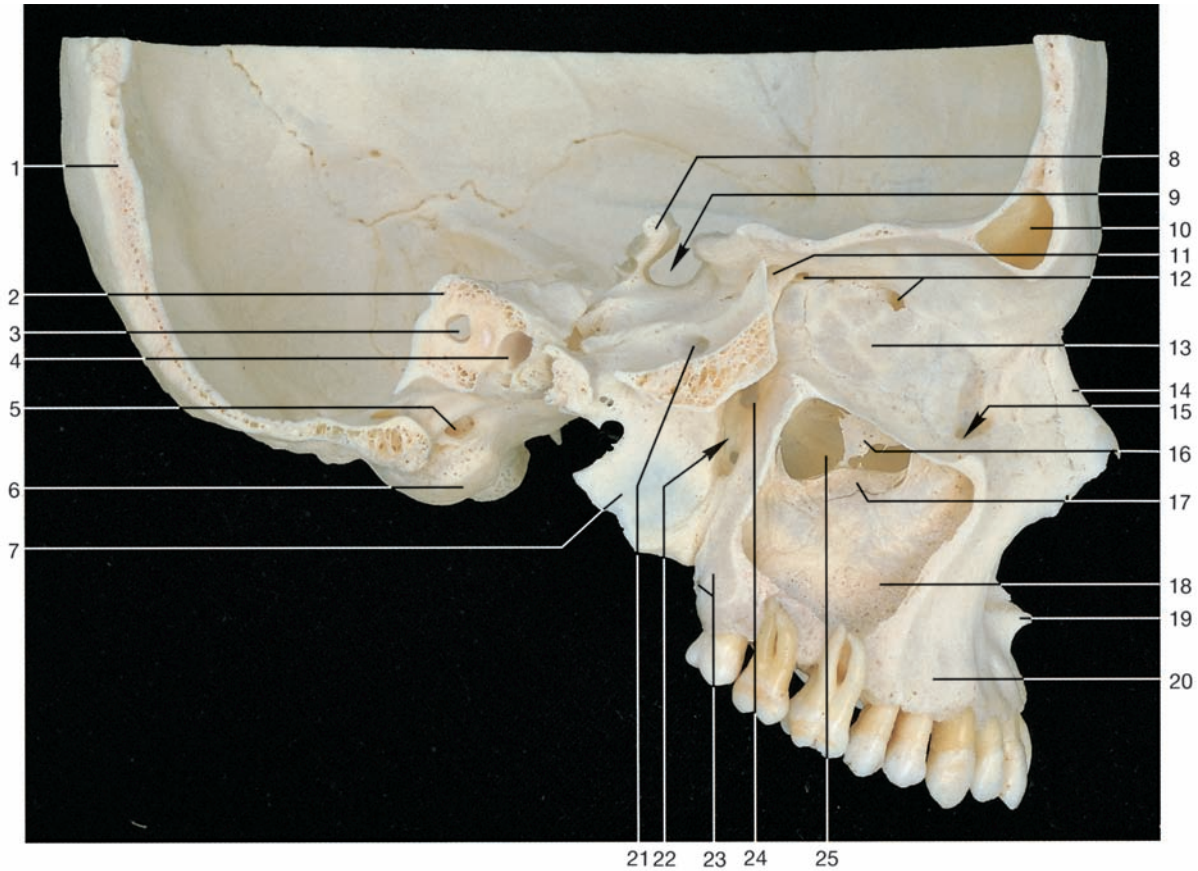
- 33 Ala of the vomer

Sutures and choanae

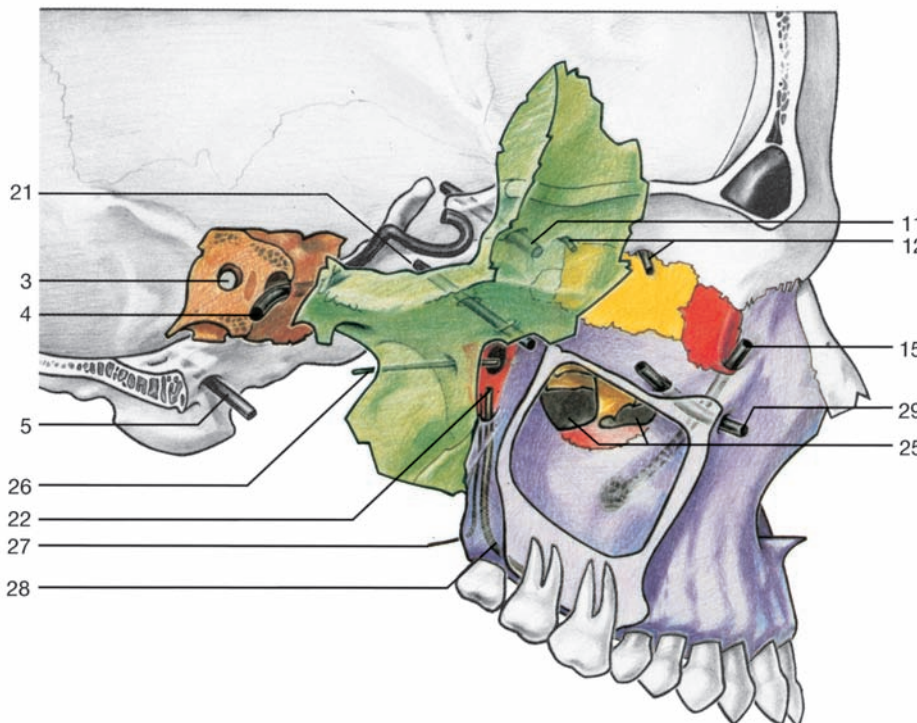
- 34 Median palatine suture
- 35 Transverse palatine suture
- 36 Choanae



Anterior view of both maxillae forming the anterior bony aperture of the nose.



Pterygopalatine fossa, maxillary sinus, and orbit. Paramedian section through the skull (right side, lateral aspect). Frontal and maxillary sinuses are opened.



- 1 Occipital bone
- 2 Temporal bone (petrous part)
- 3 Internal acoustic meatus
- 4 Carotid canal
- 5 Hypoglossal canal
- 6 Occipital condyle
- 7 Lateral plate of pterygoid process
- 8 Dorsum of sella turcica
- 9 Sella turcica
- 10 Frontal sinus
- 11 Optic canal
- 12 Posterior and anterior ethmoidal foramina
- 13 Orbital plate of ethmoidal bone
- 14 Nasal bone
- 15 Nasolacrimal canal
- 16 Uncinate process
- 17 Inferior nasal concha (maxillary process)
- 18 Maxillary sinus
- 19 Anterior nasal spine
- 20 Alveolar process of maxilla
- 21 Foramen rotundum
- 22 Pterygopalatine fossa
- 23 Tuberosity of maxilla with alveolar foramina
- 24 Sphenopalatine foramen
- 25 Maxillary hiatus
- 26 Pterygoid or Vidian canal
- 27 Lesser palatine canal
- 28 Greater palatine canal
- 29 Infra-orbital canal

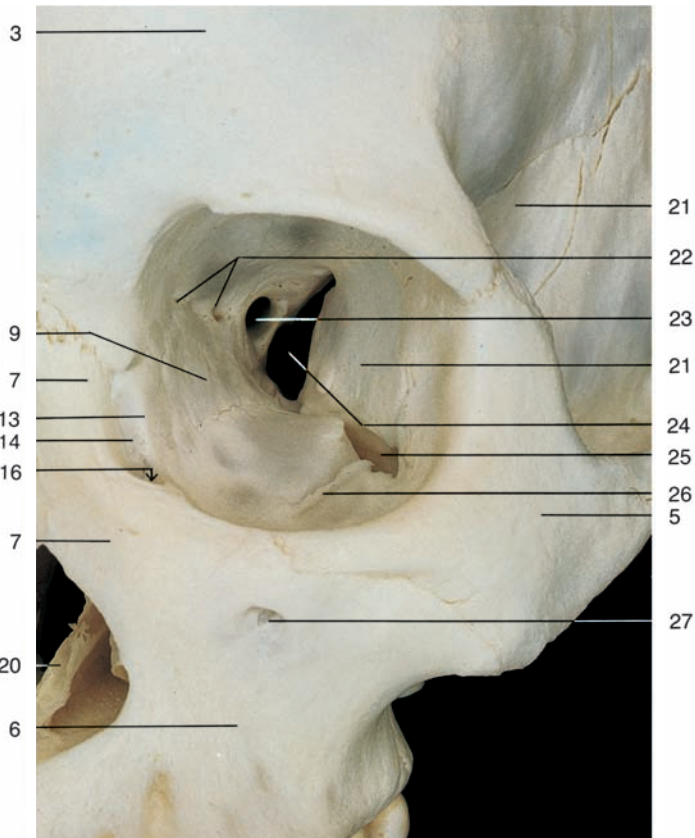
Illustration of canals and foramina connected with the right orbit and pterygopalatine fossa (compare with the figure above). The greater wing of sphenoidal bone (green) is shown as being transparent. Brown = temporal bone; yellow = ethmoidal bone; red = lacrimal bone; light red = inferior nasal concha; violet = maxilla; red = palatine bone.



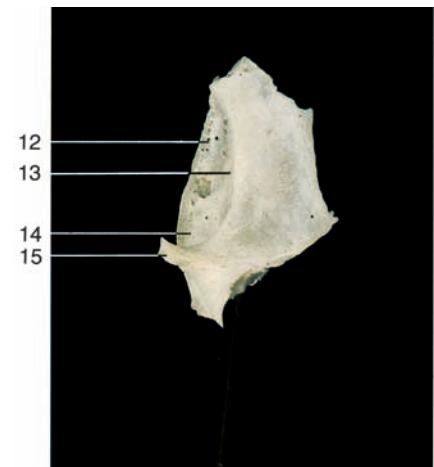
- 1 Occipital bone
- 2 Temporal bone
- 3 Frontal bone
- 4 Nasal spine of frontal bone
- 5 Zygomatic bone
- 6 Maxilla
- 7 Frontal process of maxilla
- 8 Ethmoidal bone
- 9 Orbital plate of ethmoidal bone
- 10 Perpendicular plate of ethmoidal bone
- 11 Site of lacrimal bone
- 12 Lacrimal groove of lacrimal bone
- 13 Posterior lacrimal crest
- 14 Fossa for lacrimal sac
- 15 Lacrimal hamulus
- 16 Nasolacrimal canal
- 17 Site of nasal bone
- 18 Nasal foramina of nasal bone
- 19 Anterior nasal spine of maxilla
- 20 Vomer
- 21 Greater wing of sphenoidal bone
- 22 Anterior and posterior ethmoidal foramina
- 23 Optic canal
- 24 Superior orbital fissure
- 25 Inferior orbital fissure
- 26 Infra-orbital groove
- 27 Infra-orbital foramen

Part of a disarticulated skull (antero-lateral aspect).

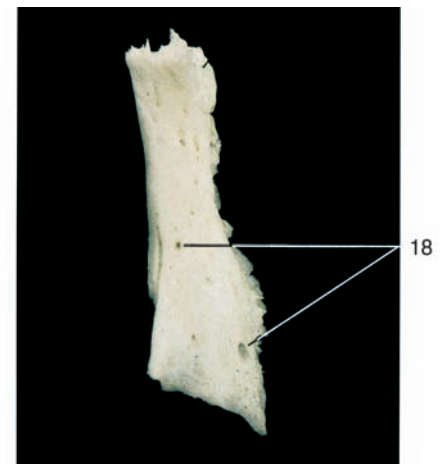
Orange = zygomatic bone; yellow = ethmoidal bone; dark green = sphenoidal bone. The arrows indicate the locations of the lacrimal bone (11) and the nasal bone (17).



Left orbit (anterior aspect).



Left lacrimal bone (anterior aspect).



Left nasal bone (anterior aspect).



- 1 Frontal sinus
- 2 Ethmoidal air cells
- 3 Sphenoidal sinus
- 4 Superior nasal concha
- 5 Middle nasal concha
- 6 Maxillary hiatus
- 7 Inferior nasal concha
- 8 Palatine bone
- 9 Maxilla
- 10 Inferior meatus
- 11 Palatine process of the maxilla



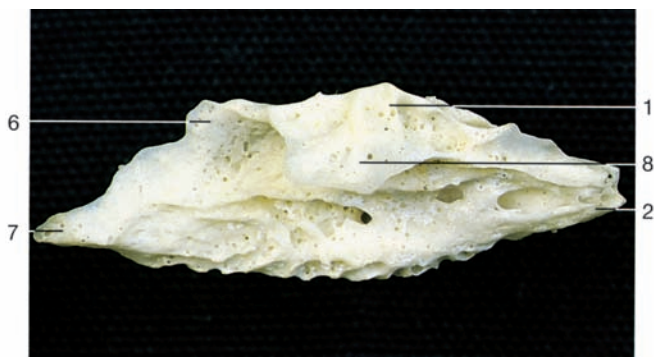
To page 49:

Blue	=	Occipital bone
Light green	=	Parietal bone
Yellow	=	Frontal bone
Dark brown	=	Temporal bone
Red	=	Sphenoidal bone
Dark green	=	Ethmoidal bone
Light blue	=	Nasal bone
Pink	=	Inferior concha
Orange	=	Vomer
Violet	=	Maxilla
White	=	Palatine bone
White	=	Mandible

Lateral wall of the nasal cavity. Median section through the skull.



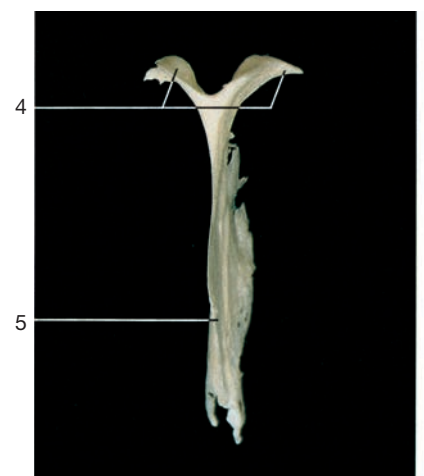
Right inferior nasal concha (medial aspect). Anterior part to the left.



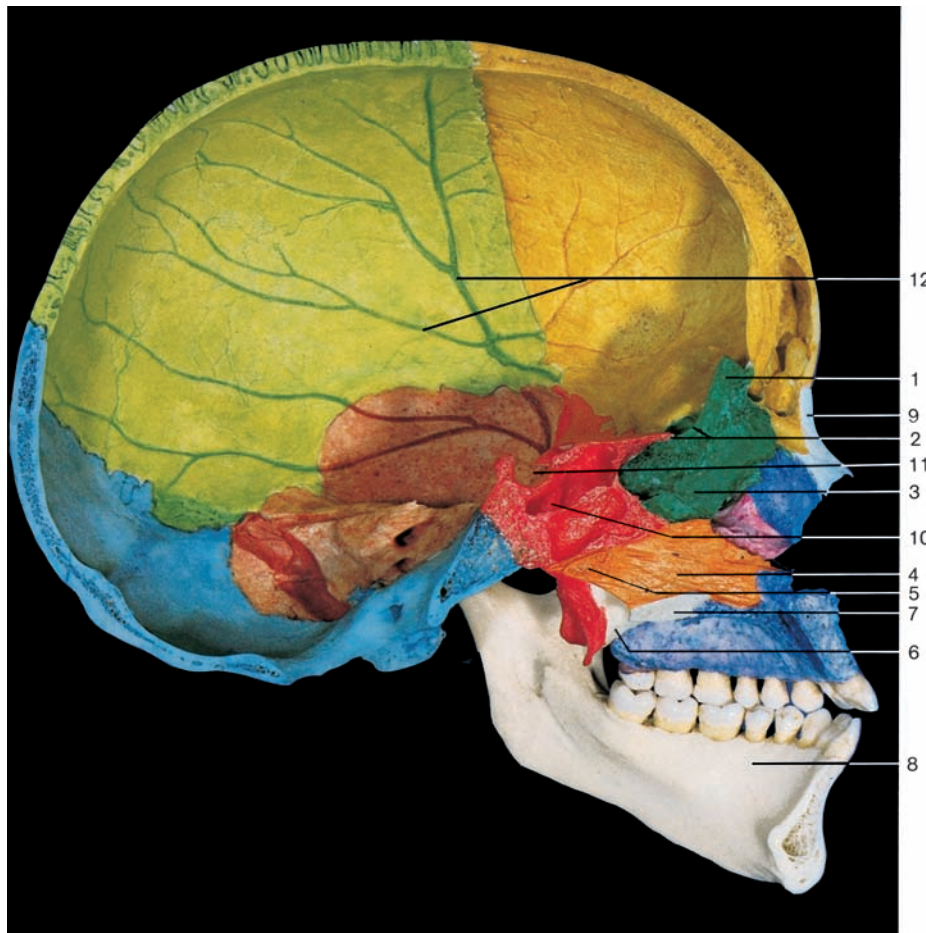
Right inferior nasal concha (lateral aspect). Anterior part to the right.

Inferior concha and vomer

- 1 Ethmoidal process
- 2 Anterior part of concha
- 3 Inferior border
- 4 Ala of vomer
- 5 Posterior border of nasal septum
- 6 Lacrimal process
- 7 Posterior part of concha
- 8 Maxillary process



Vomer (posterior aspect).

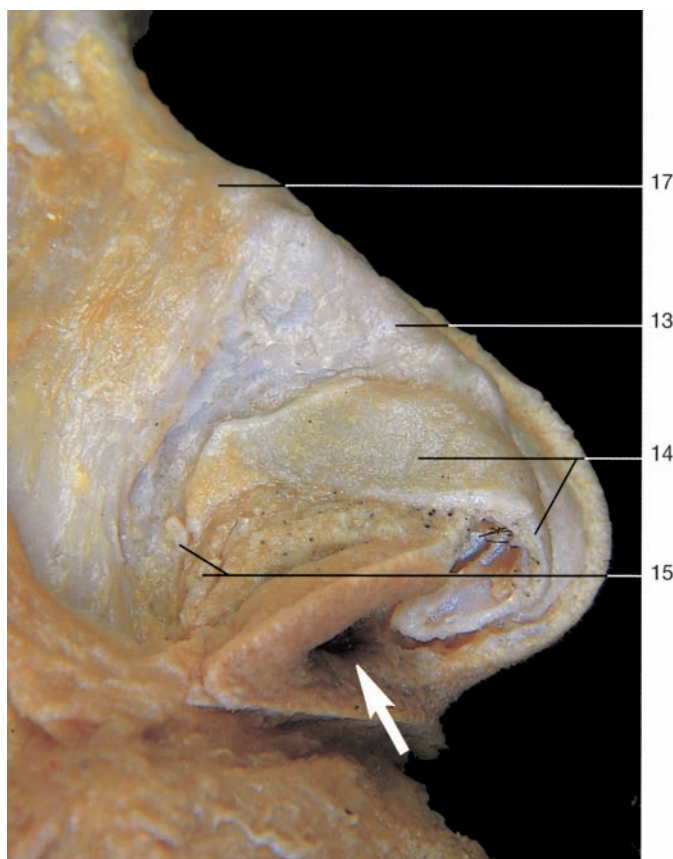


- 1 Crista galli
- 2 Cribriform plate of ethmoidal bone
- 3 Perpendicular plate of ethmoidal bone
- 4 Vomer
- 5 Ala of the vomer
- 6 Palatine bone (perpendicular process)
- 7 Palatine bone (horizontal plate)
- 8 Mandible
- 9 Nasal bone
- 10 Sphenoidal sinus
- 11 Hypophysial fossa (sella turcica)
- 12 Grooves for the middle meningeal artery

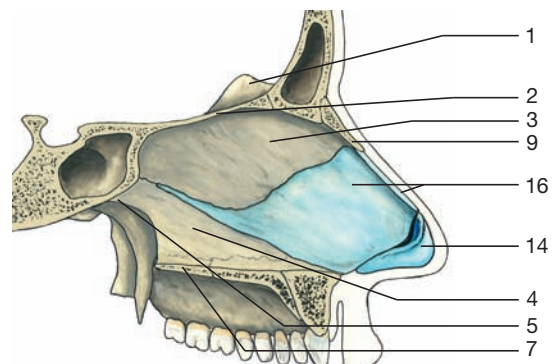
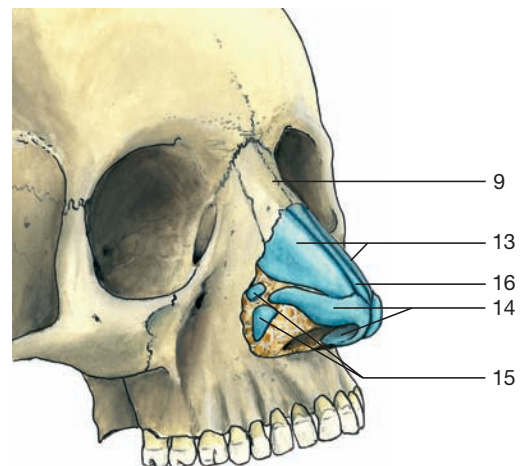
Cartilages of the nose

- 13 Lateral nasal cartilage
- 14 Greater alar cartilage
- 15 Lesser alar cartilages
- 16 Septal cartilage
- 17 Location of nasal bone

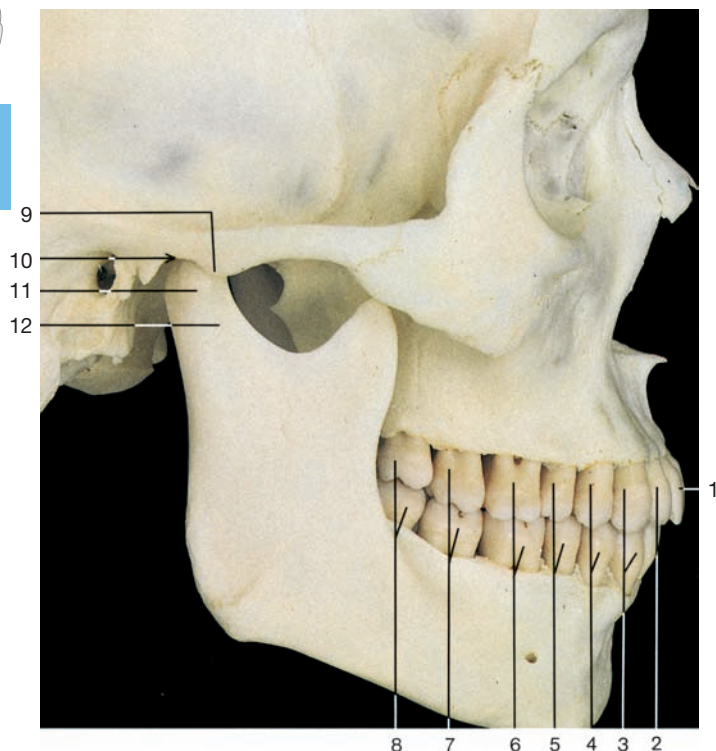
Paramedian sagittal section through the skull including the nasal septum.



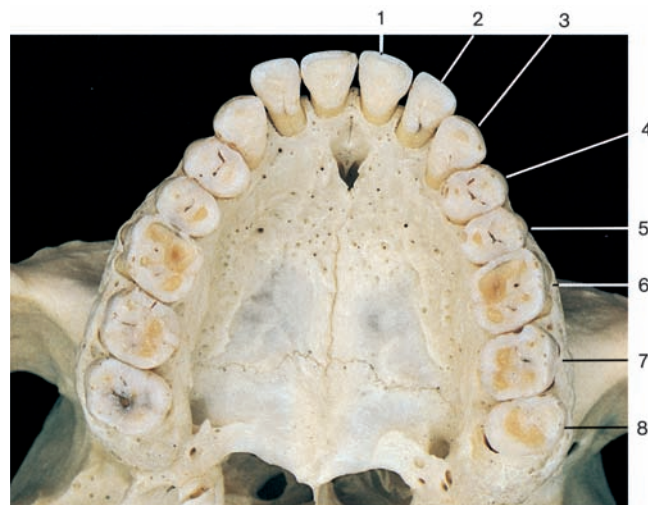
Cartilages of the nose (right anterior aspect). Arrow: nostril, framed by nasal wing.



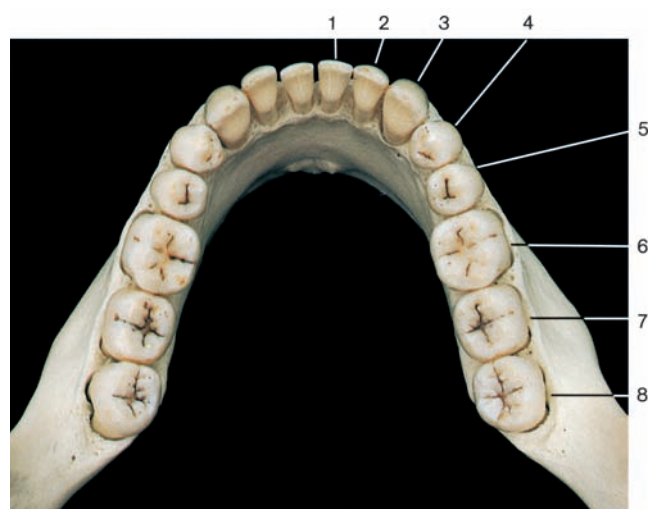
Shape of the cartilages of the nose.



Normal position of the teeth. Dentition in centric occlusion (lateral aspect).



Upper teeth of the adult (inferior aspect).

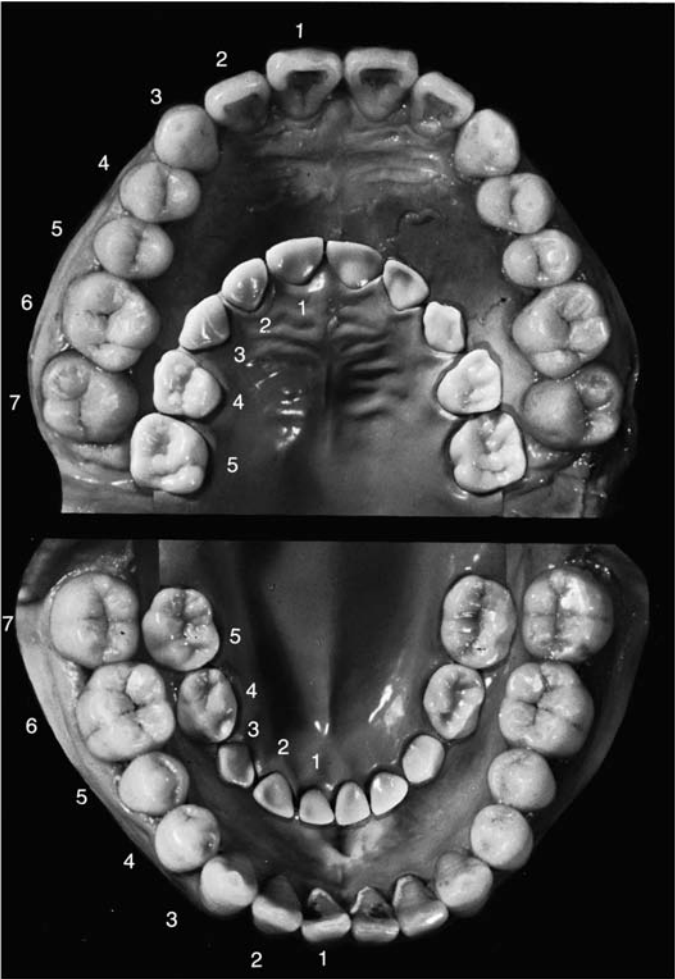


Lower teeth of the adult (superior aspect).

- 1 Central incisor
- 2 Lateral incisor
- 3 Canines
- 4 First premolars or bicuspid
- 5 Second premolars or bicuspid
- 6 First molars
- 7 Second molars
- 8 Third molars
- 9 Articular tubercle
- 10 Mandibular fossa
- 11 Head of mandible
- 12 Condylar process
- 13 Hard palate and palatine glands
- 14 Oral cavity
- 15 Upper molar
- 16 Oral vestibule
- 17 Lower molar
- 18 Platysma muscle
- 19 Mandible
- 20 Maxillary sinus
- 21 Superior longitudinal muscle of tongue
- 22 Transverse muscle of tongue
- 23 Buccinator muscle
- 24 Inferior longitudinal muscle of tongue
- 25 Sublingual gland
- 26 Genioglossus muscle



Coronal section through the oral cavity (anterior aspect).



Deciduous teeth in a child's skull. The developing crowns of the permanent teeth are displayed in their crypts in the maxilla and mandible.

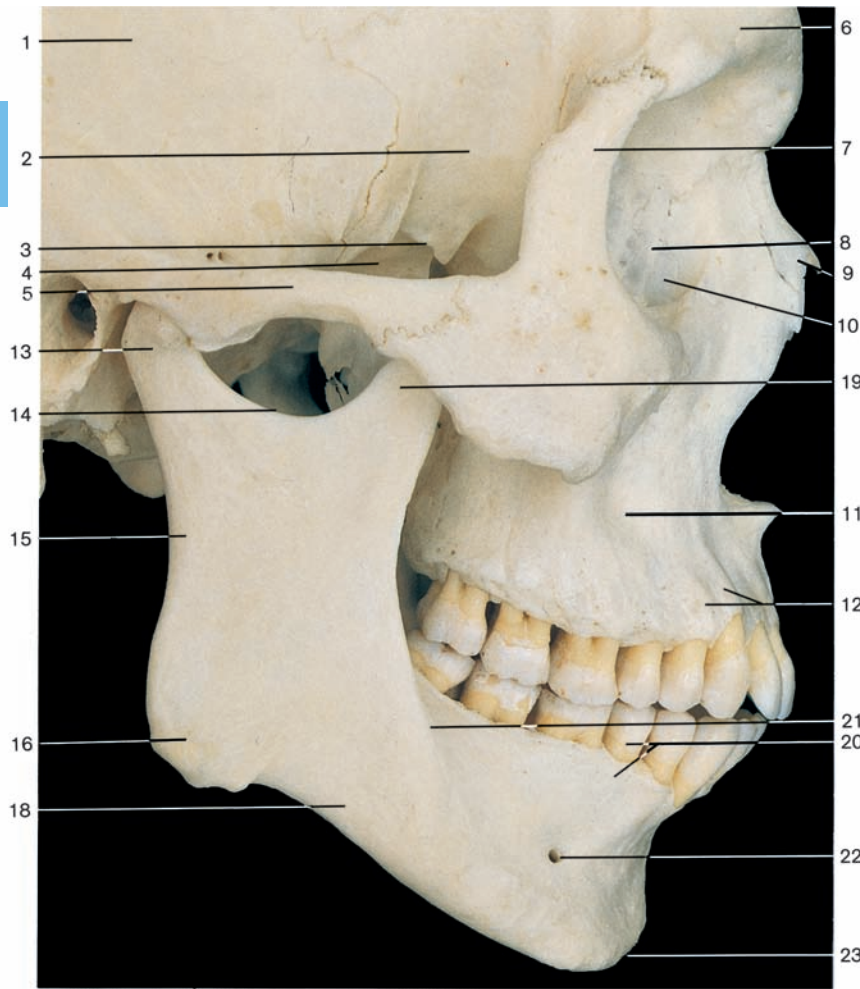
- 1 Permanent incisors
- 2 Permanent cuspid (canine)
- 3 Premolars
- 4 First permanent molar
- 5 Second permanent molar
- 6 Mental foramen

Comparison of the deciduous and permanent teeth.

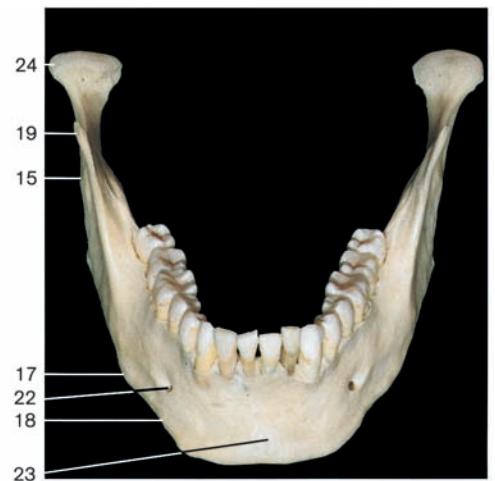
Notice that the breadth of the alveolar arch of the child's mandible and maxilla holding the deciduous teeth is nearly the same as the comparable portion in the jaws of the adult. Note the emergence of the third molars. The numbers of the teeth correspond to the numbers in the figure below.



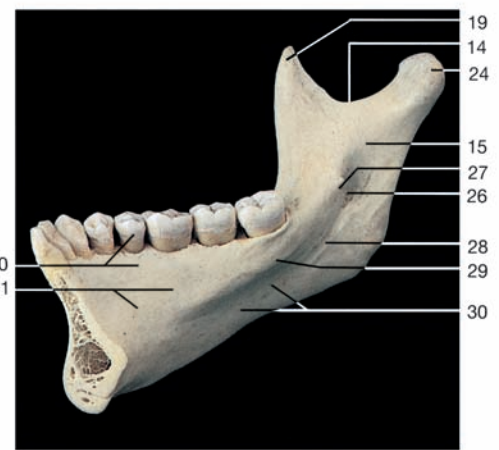
Isolated teeth of the alveolar part of the maxilla (top row) and the mandible (lower row), labial surface of the teeth.



Lateral aspect of the facial bones. Mandible and teeth in the position of occlusion. Upper and lower jaw occluded.



Mandible of the adult (anterior aspect).



Right half of the mandible (medial aspect).



Mandible of the adult (superior aspect).

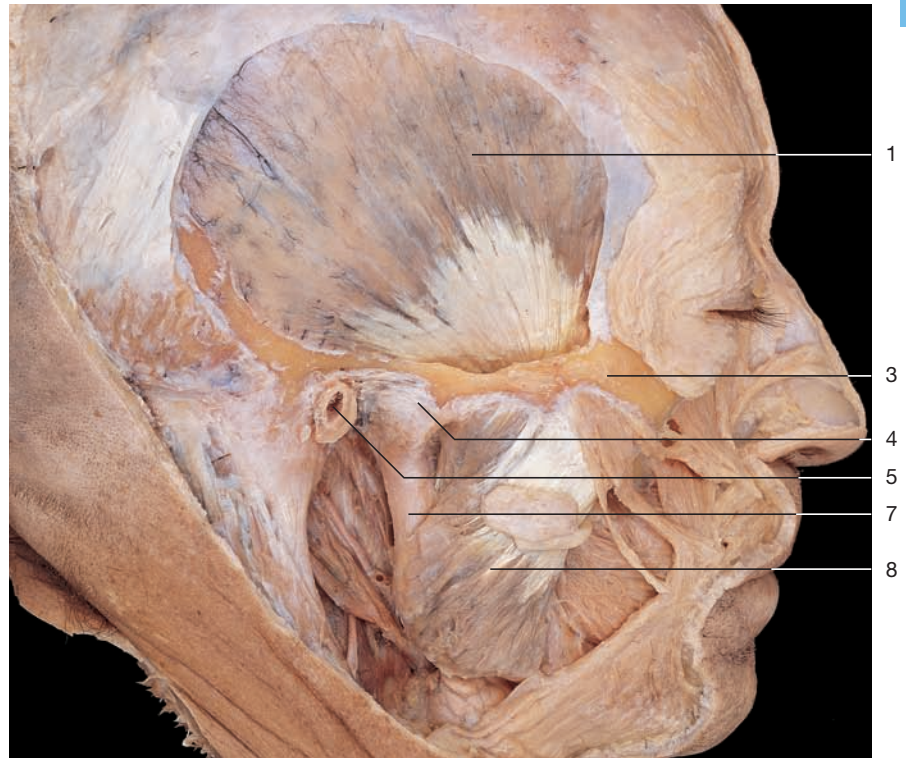
- 1 Temporal bone
- 2 Temporal fossa (greater wing of sphenoidal bone)
- 3 Infratemporal crest
- 4 Infratemporal fossa
- 5 Zygomatic arch
- 6 Frontal bone
- 7 Zygomatic bone (frontal process)
- 8 Lacrimal bone
- 9 Nasal bone
- 10 Lacrimal groove
- 11 Maxilla (canine fossa)
- 12 Alveolar process of maxilla

Mandible

- | | |
|-------------------------------------|--|
| 13 Condylar process | 25 Genial tubercle or mental spine |
| 14 Mandibular notch | 26 Mandibular foramen (entrance to mandibular canal) |
| 15 Ramus of the mandible | 27 Lingula |
| 16 Masseteric tuberosity | 28 Mylohyoid sulcus |
| 17 Angle of the mandible | 29 Mylohyoid line |
| 18 Body of the mandible | 30 Submandibular fossa |
| 19 Coronoid process | 31 Sublingual fossa |
| 20 Alveolar process including teeth | |
| 21 Oblique line | |
| 22 Mental foramen | |
| 23 Mental protuberance | |
| 24 Head of the mandible | |

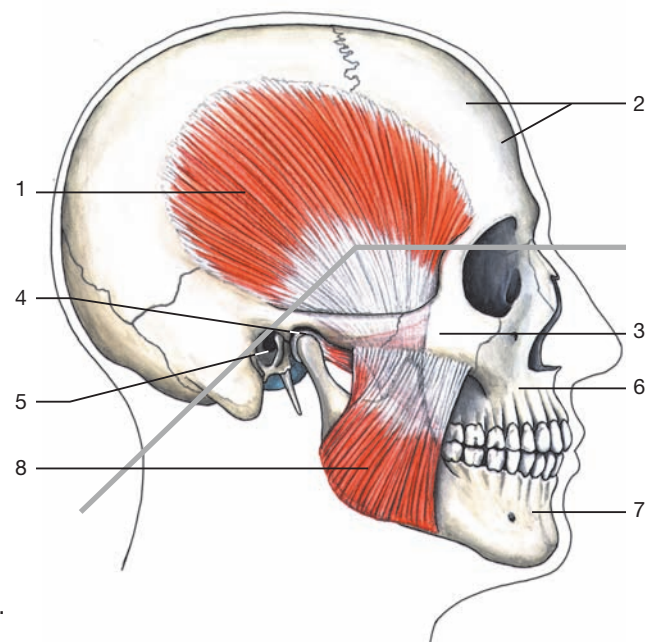


2.2 Masticatory Apparatus and Muscles of the Head

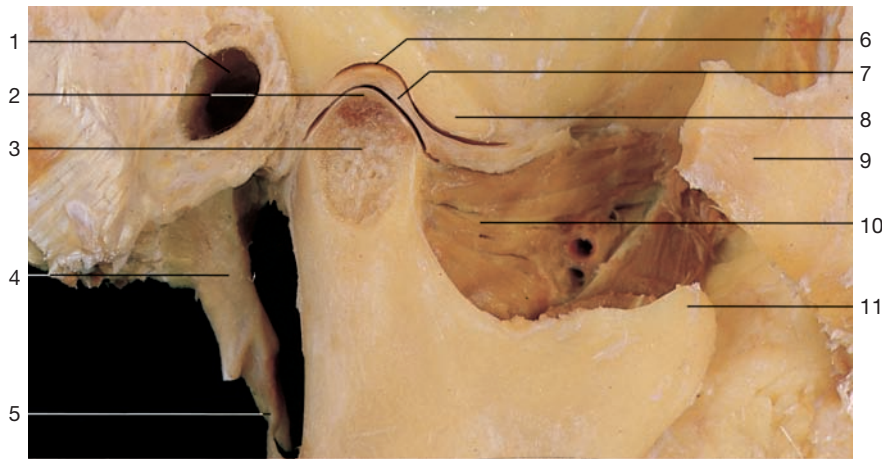


Muscles of mastication and facial muscles (lateral aspect). The auricle has been removed.

- 1 Temporal muscle
- 2 Frontal bone
- 3 Zygomatic arch
- 4 Temporomandibular joint
- 5 External acoustic meatus
- 6 Maxilla
- 7 Mandible
- 8 Masseter muscle



Temporomandibular joint and muscles of mastication (lateral aspect). The base of the skull is bent (gray line).



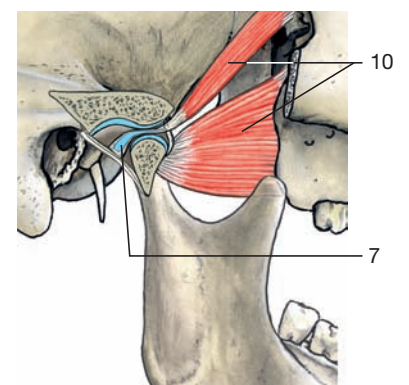
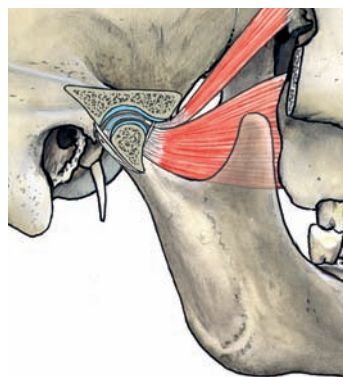
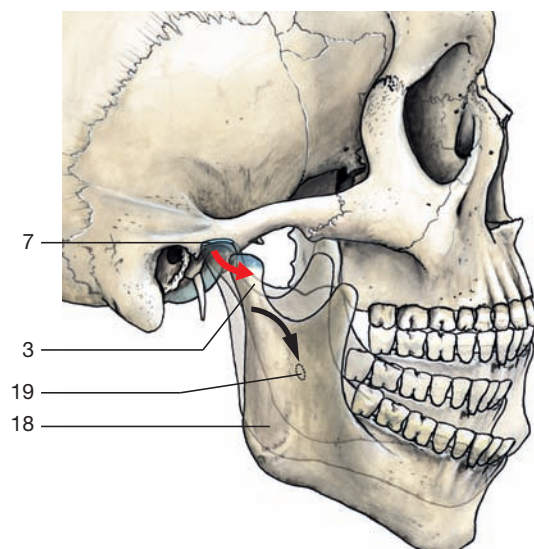
Temporomandibular joint (sagittal section).

- 1 External acoustic meatus
- 2 Articular cartilage of condylar process
- 3 Condylar process of mandible
- 4 Styloid process
- 5 Stylomandibular ligament
- 6 Mandibular fossa
- 7 Articular disc
- 8 Articular tubercle
- 9 Zygomatic bone
- 10 Lateral pterygoid muscle
- 11 Coronoid process of mandible
- 12 Posterior belly of digastric muscle
- 13 Masseter muscle
- 14 Temporal muscle
- 15 Medial pterygoid muscle
- 16 Parotid duct
- 17 Buccinator muscle
- 18 Mandible
- 19 Mandibular foramen

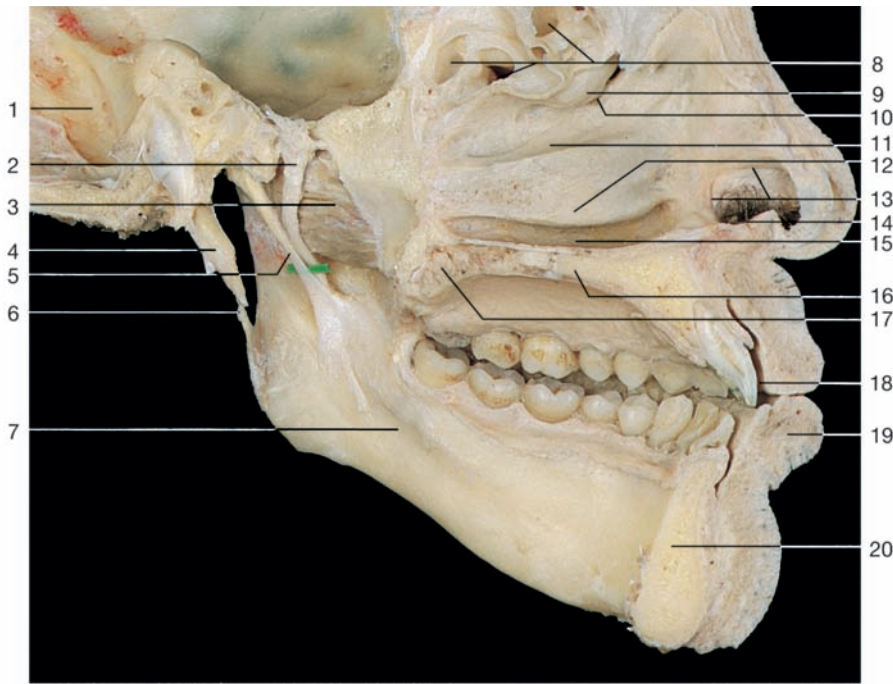


Temporomandibular joint.

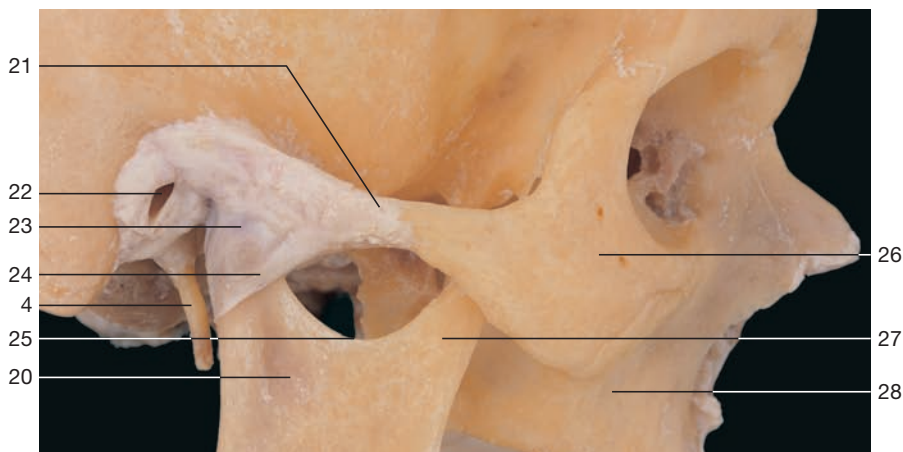
Dissection of the articular disc and the related muscles (lateral aspect).



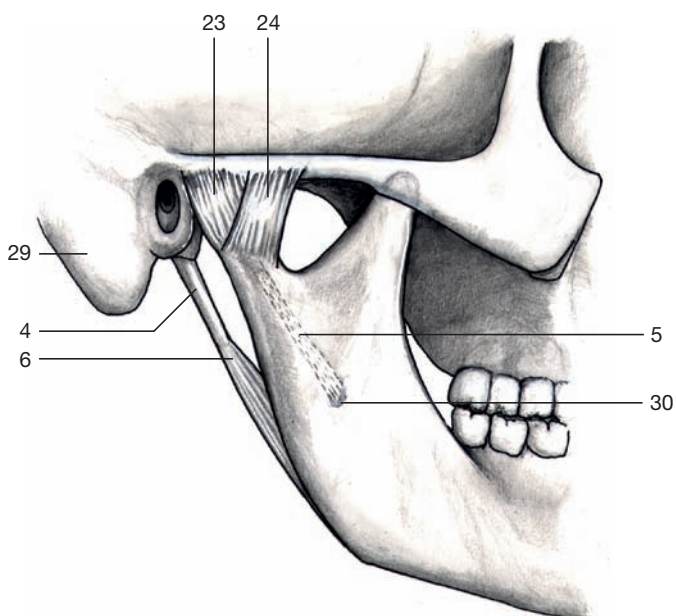
Movements of the temporomandibular joint and the related lateral pterygoid muscles.



Ligaments of temporomandibular joint. Left half of the head (medial aspect).

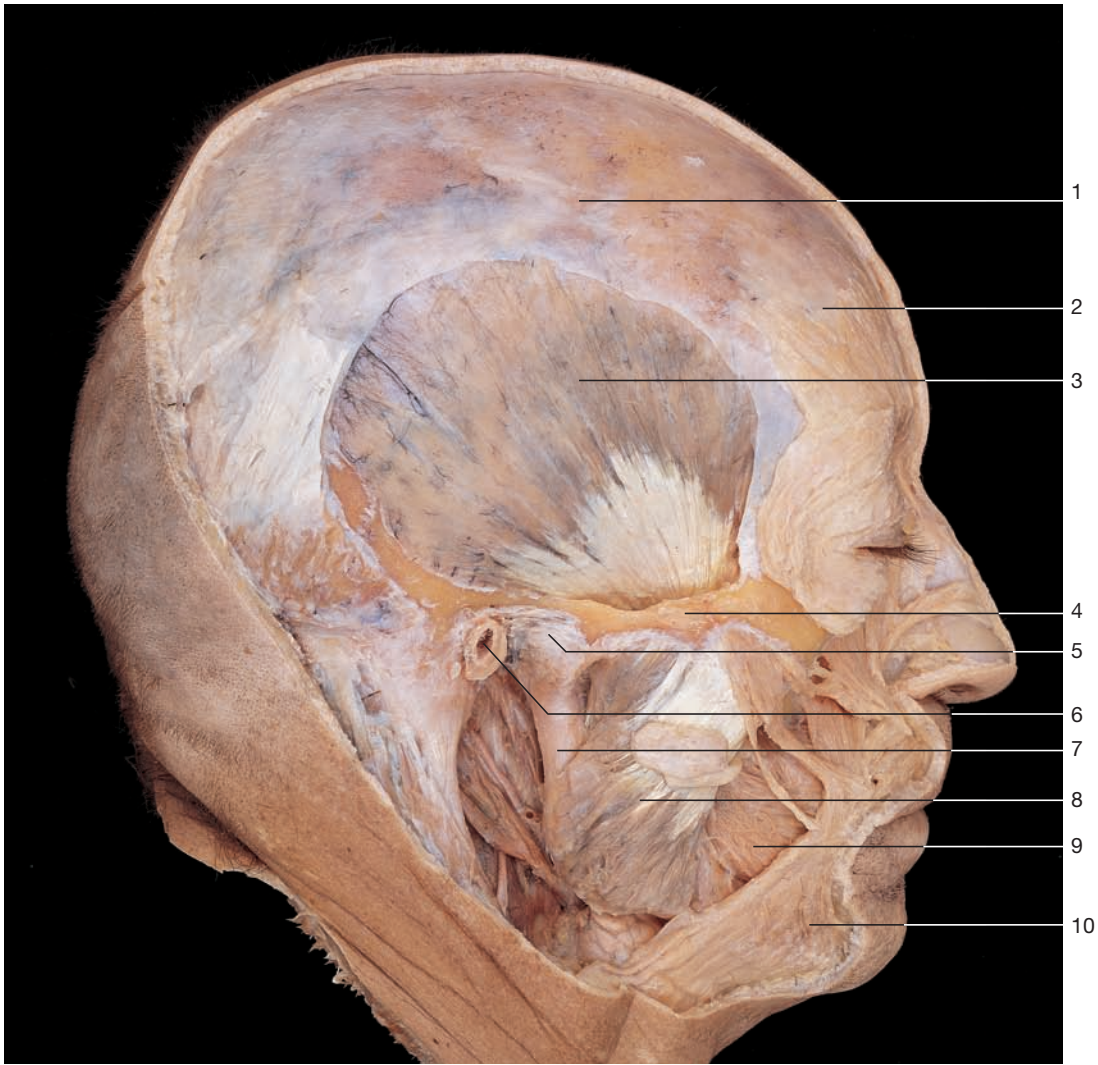


Temporomandibular joint with ligaments (lateral aspect).



Ligaments of temporomandibular joint (lateral aspect).

- 1 Groove for sigmoid sinus
- 2 Mandibular nerve
- 3 Lateral pterygoid muscle
- 4 Styloid process
- 5 Sphenomandibular ligament
- 6 Stylomandibular ligament
- 7 Mylohyoid groove
- 8 Ethmoidal air cells
- 9 Ethmoidal bulla
- 10 Hiatus semilunaris
- 11 Middle meatus
- 12 Inferior nasal concha
- 13 Limen nasi
- 14 Vestibule with hairs
- 15 Inferior meatus
- 16 Hard palate
- 17 Soft palate
- 18 Vestibule of oral cavity
- 19 Lower lip
- 20 Mandible
- 21 Zygomatic arch
- 22 External acoustic meatus
- 23 Articular capsule
- 24 Lateral ligament
- 25 Mandibular notch
- 26 Zygomatic bone
- 27 Coronoid process
- 28 Maxilla
- 29 Mastoid process
- 30 Mandibular foramen

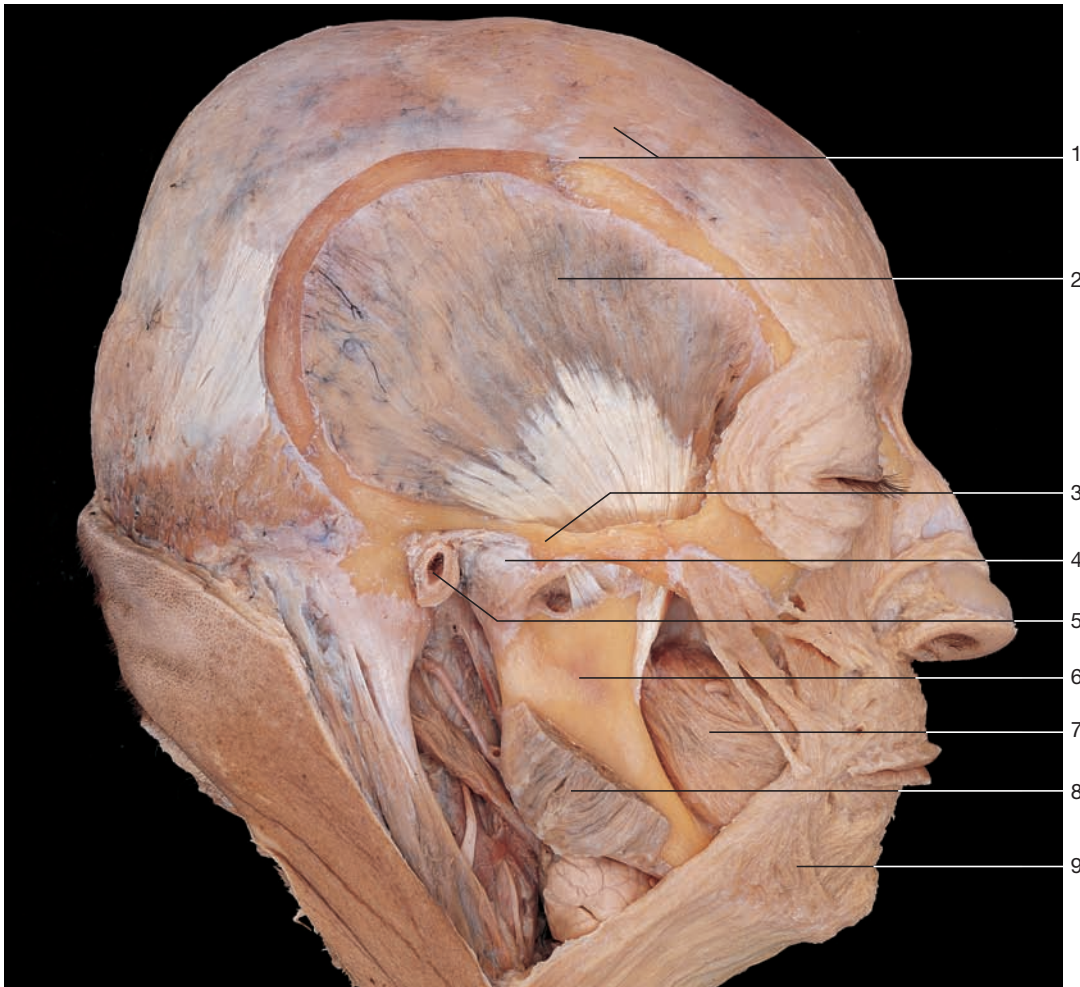


Temporomandibular joint and masticatory muscles. The masseter and temporal muscles are shown.

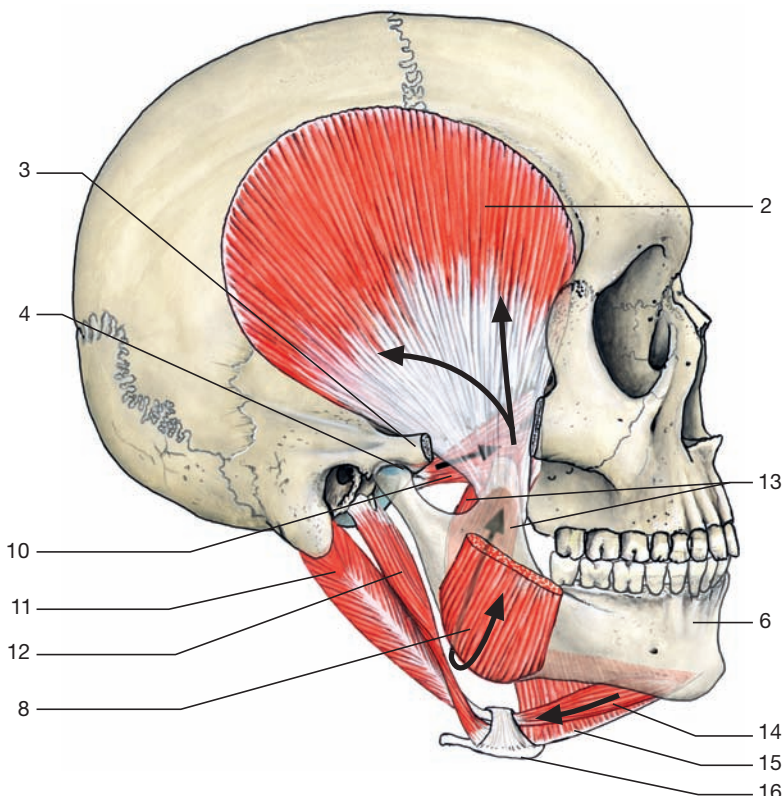


- 1 Galea aponeurotica
- 2 Frontal belly of occipitofrontalis muscle
- 3 Temporal muscle
- 4 Zygomatic arch
- 5 Temporomandibular joint
- 6 External acoustic meatus
- 7 Mandible
- 8 Masseter muscle
- 9 Buccinator muscle
- 10 Platysma muscle
- 11 Articular disc of temporomandibular joint
- 12 Coronoid process of mandible
- 13 Condylar process of mandible
- 14 Mastoid process

Temporal muscle with insertion at the mandible and the temporomandibular joint. Zygomatic arch and masseter muscle have been partly removed.

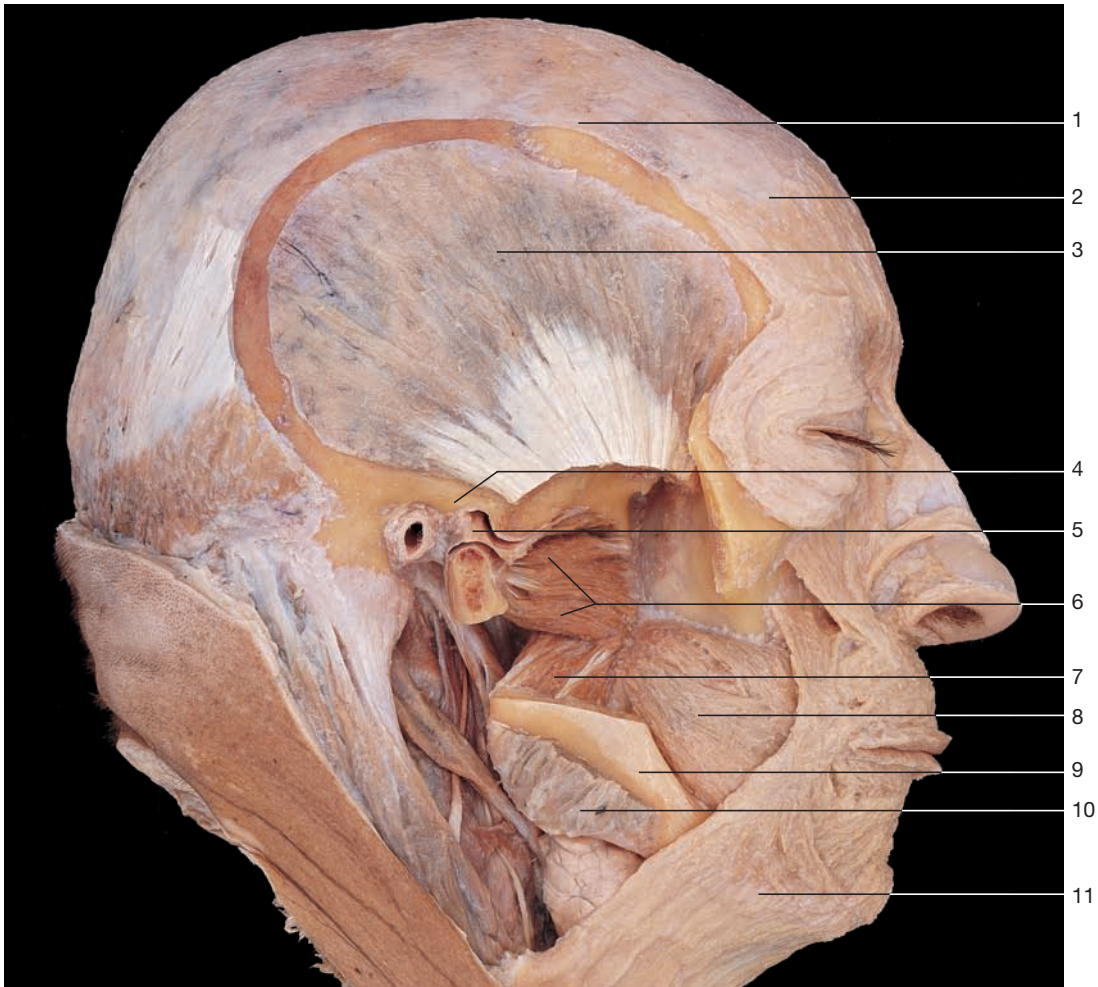


Temporomandibular joint and masticatory muscles. The masseter muscle has been partly removed.



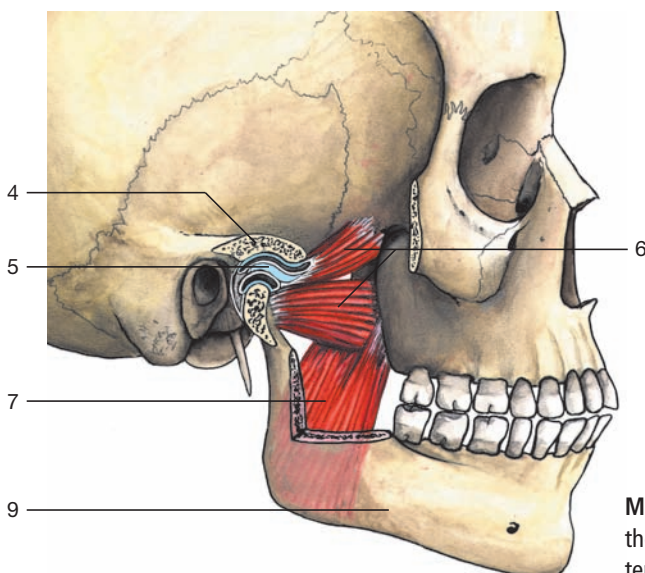
- 1 Galea aponeurotica
- 2 Temporal muscle
- 3 Zygomatic arch
- 4 Temporomandibular joint
- 5 External acoustic meatus
- 6 Mandible
- 7 Buccinator muscle
- 8 Masseter muscle (cut)
- 9 Platysma muscle
- 10 Lateral pterygoid muscle
- 11 Posterior belly of digastric muscle
- 12 Stylohyoid muscle
- 13 Medial pterygoid muscle
- 14 Anterior belly of digastric muscle
- 15 Mylohyoid muscle
- 16 Hyoid bone

Effect of the masticatory muscles on the temporomandibular joint (arrows).



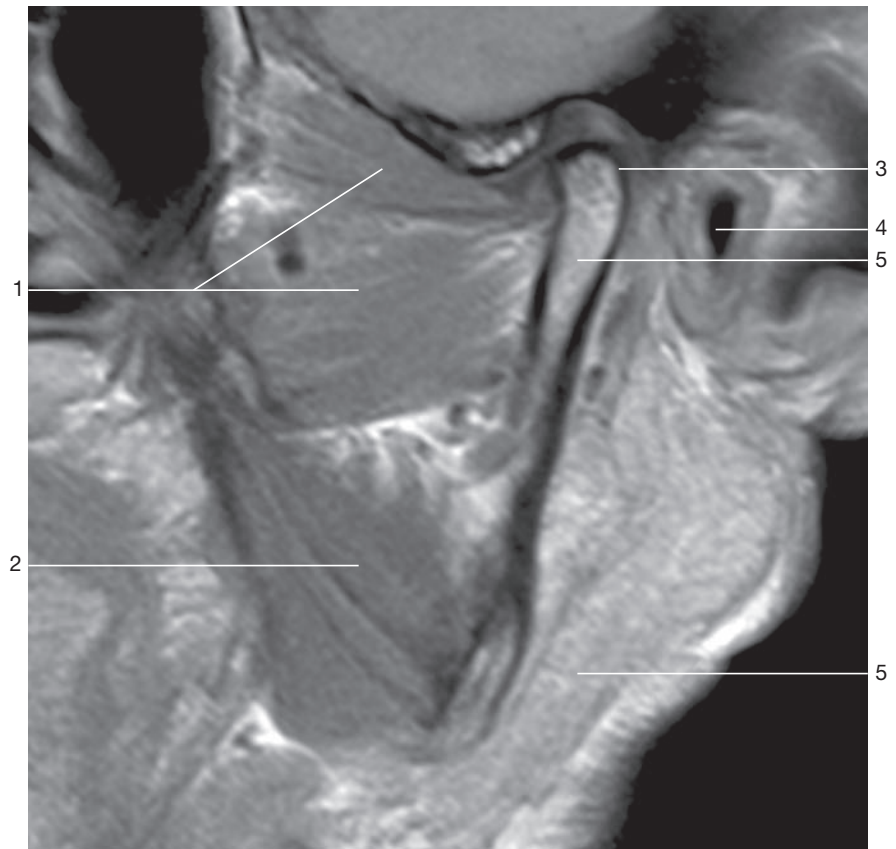
Temporomandibular joint and masticatory muscles. The zygomatic arch and part of the mandible have been removed to reveal the medial and lateral pterygoid muscles.

- | | |
|---|---------------------------|
| 1 Galea aponeurotica | 7 Medial pterygoid muscle |
| 2 Frontal belly of occipitofrontalis muscle | 8 Buccinator muscle |
| 3 Temporal muscle | 9 Mandible |
| 4 Zygomatic arch | 10 Masseter muscle |
| 5 Articular disc of temporomandibular joint | 11 Platysma muscle |
| 6 Lateral pterygoid muscle | |

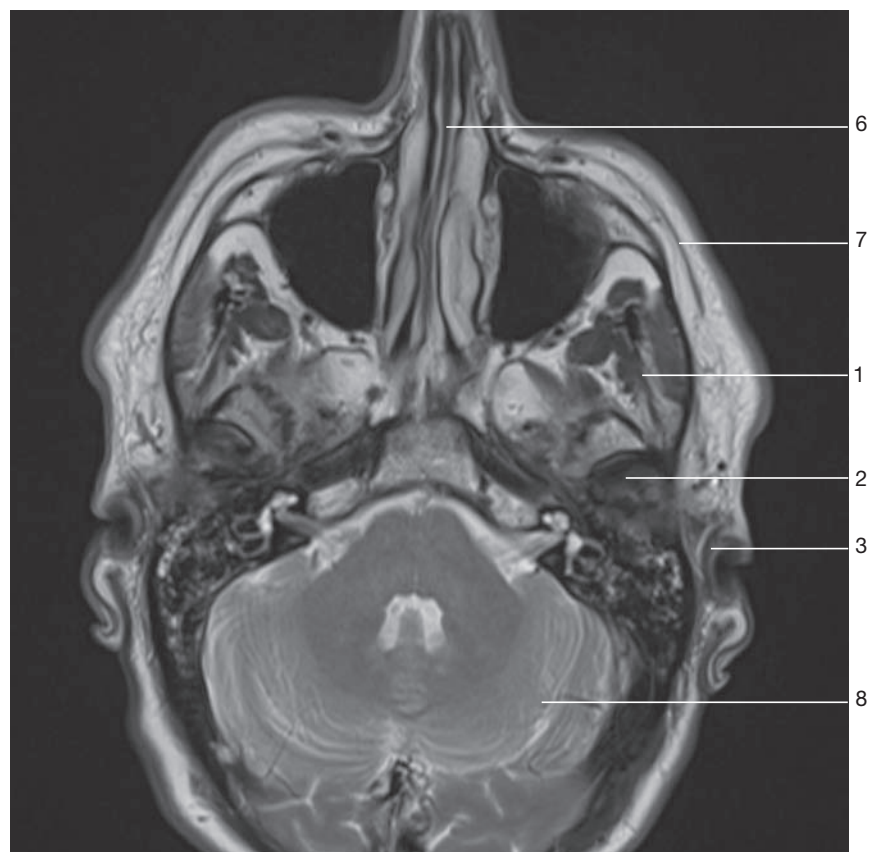


Medial and lateral pterygoid muscles and their connections with the articular disc of the temporomandibular joint.

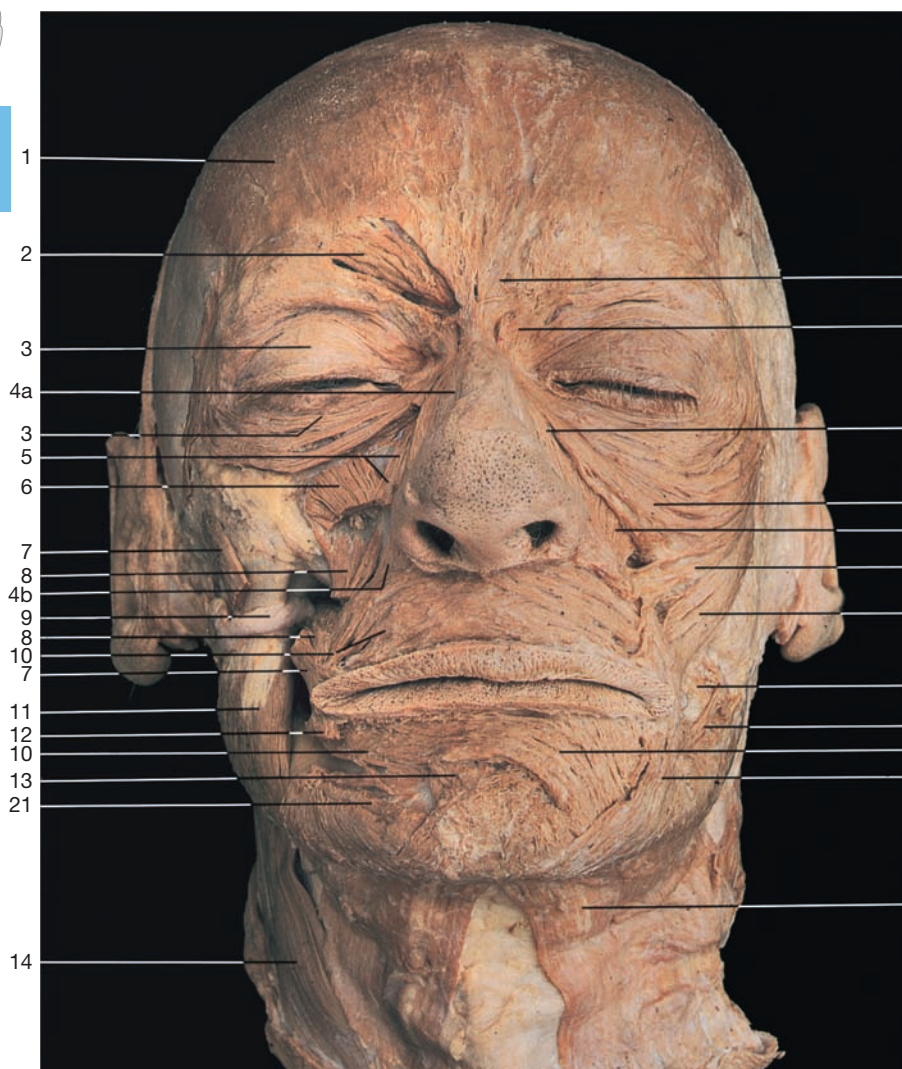
- 1 Lateral pterygoid muscles
- 2 Medial pterygoid muscle
- 3 Temporomandibular joint
- 4 External acoustic meatus
- 5 Mandible
- 6 Nasal septum
- 7 Facial muscle
- 8 Cerebellum



Temporomandibular joint and masticatory muscles, sagittal section (MRI scan).
(Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

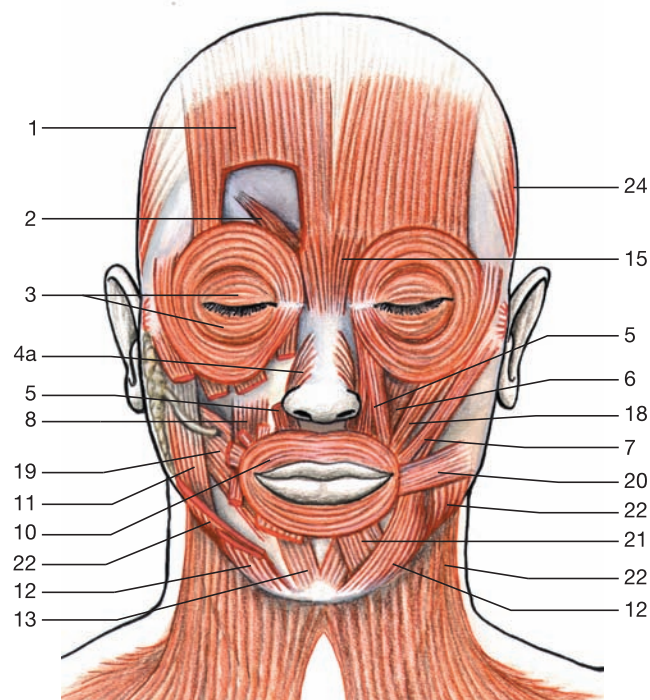


Temporomandibular joint and masticatory muscles, axial section (MRI scan).
(Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

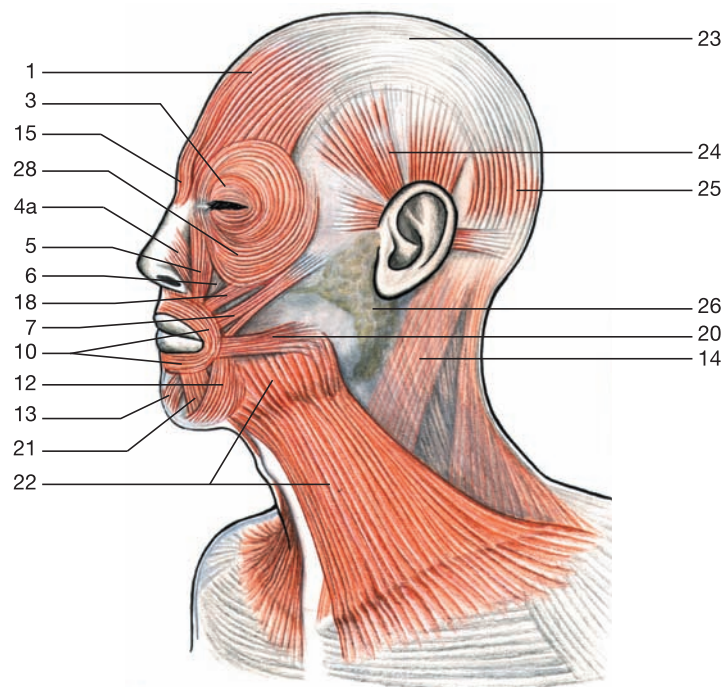


- 1 Frontal belly of occipitofrontalis muscle
- 2 Corrugator supercilii muscle
- 3 Palpebral part of orbicularis oculi muscle
- 4a Transverse part of nasalis muscle
- 4b Alar part of nasalis muscle
- 5 Levator labii superioris alaeque nasi muscle
- 6 Levator labii superioris muscle
- 7 Zygomaticus major muscle
- 8 Levator anguli oris muscle
- 9 Parotid duct
- 10 Orbicularis oris muscle
- 11 Masseter muscle
- 12 Depressor anguli oris muscle
- 13 Mentalis muscle
- 14 Sternocleidomastoid muscle
- 15 Procerus muscle
- 16 Depressor supercilii muscle
- 17 Orbital part of orbicularis oculi muscle
- 18 Zygomaticus minor muscle
- 19 Buccinator muscle
- 20 Risorius muscle
- 21 Depressor labii inferioris muscle
- 22 Platysma muscle
- 23 Galea aponeurotica
- 24 Temporoparietalis muscle
- 25 Occipital belly of occipitofrontalis muscle
- 26 Parotid gland with fascia
- 27 Temporal fascia
- 28 Orbicularis oculi muscle
- 29 Parotid duct and masseter muscle

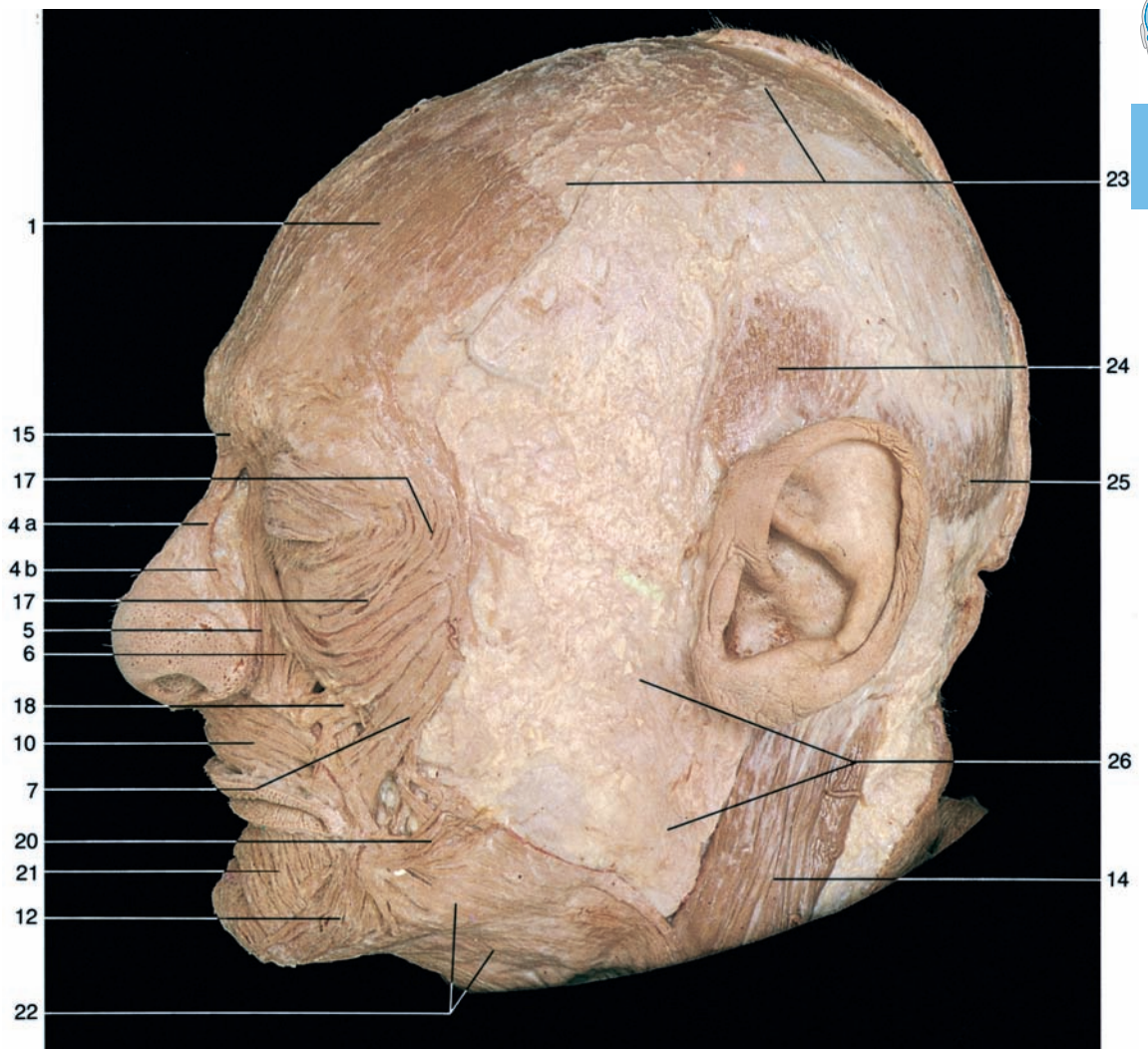
Facial muscles (anterior aspect). Left side: superficial layer, right side: deeper layer.



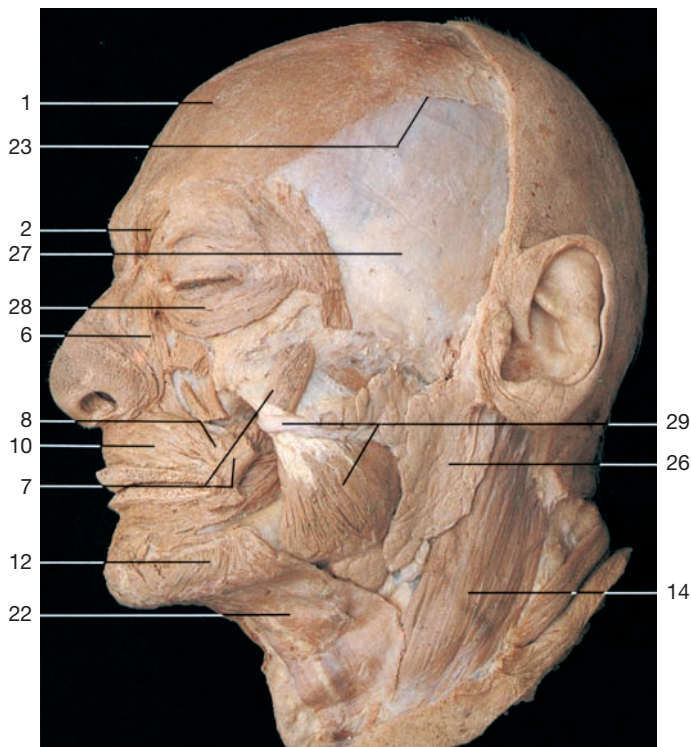
Facial muscles (anterior aspect).
Left side: superficial layer, right side: deeper layer.



Facial muscles (lateral aspect). Sphincter-like muscles surround the orifices of the head. Radially arranged muscles work as their antagonists.



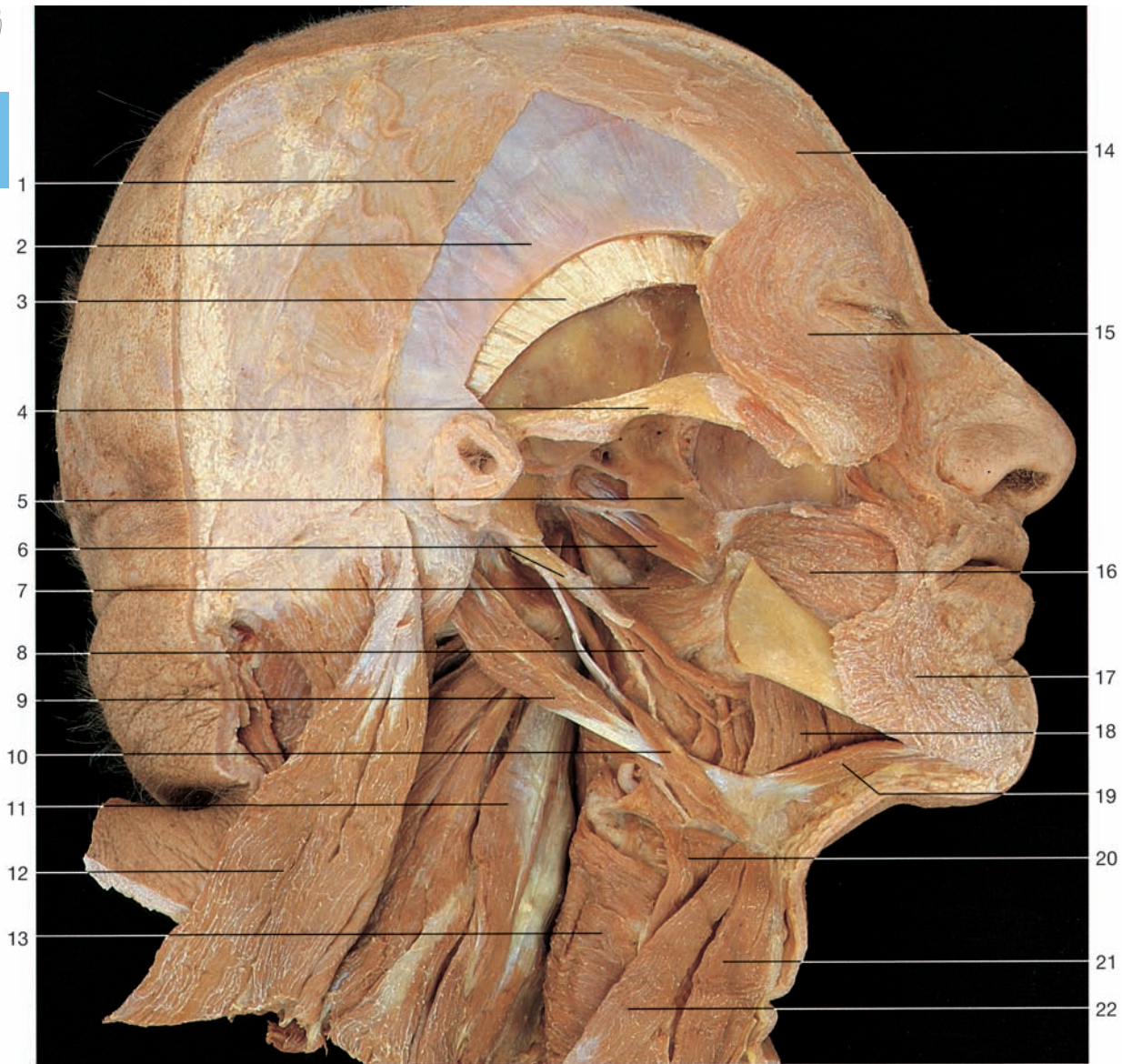
Facial muscles (lateral aspect).



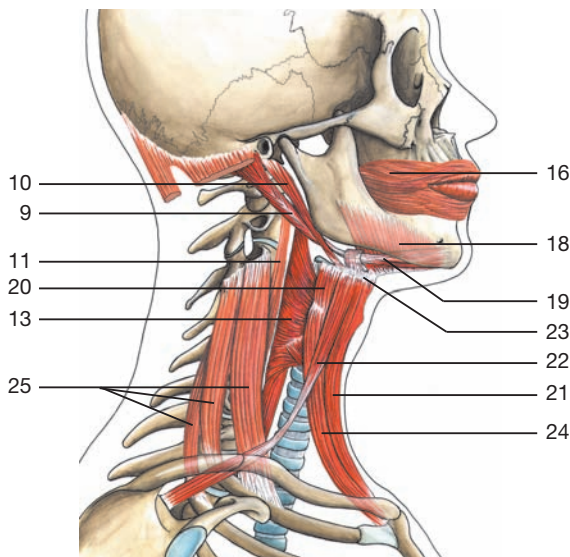
Facial muscles and parotid gland (lateral aspect).



Platysma muscle (oblique-lateral aspect). Superficial lamina of cervical fascia partly removed.



Supra- and infrahyoid muscles and pharynx (lateral aspect). Ramus of mandible, pterygoid muscles, and insertion of temporal muscle removed.



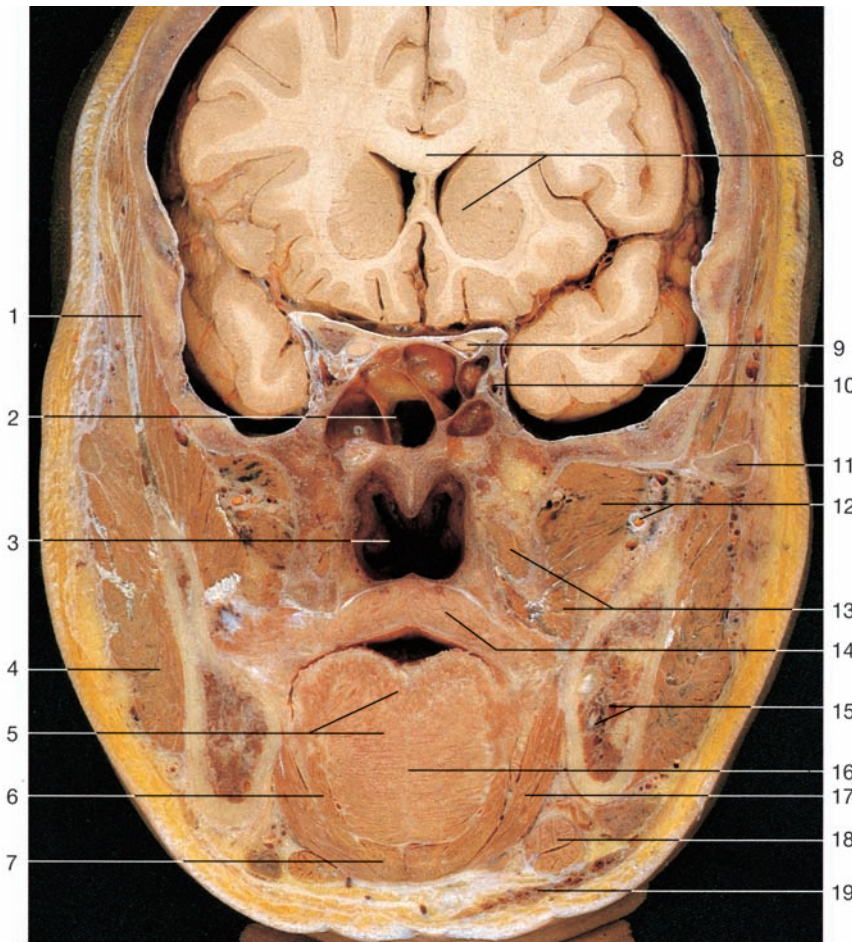
Supra- and infrahyoid muscles (lateral aspect).

- 1 Galea aponeurotica
- 2 Temporal fascia
- 3 Tendon of temporal muscle
- 4 Zygomatic arch
- 5 Lateral pterygoid plate
- 6 Tensor veli palatini muscle (styloid process)
- 7 Superior constrictor muscle of pharynx
- 8 Styloglossus muscle
- 9 Posterior belly of digastric muscle
- 10 Stylohyoid muscle
- 11 Longus capitis muscle
- 12 Sternocleidomastoid muscle (reflected)
- 13 Inferior constrictor of pharynx
- 14 Frontal belly of occipitofrontalis muscle
- 15 Orbital part of orbicularis oculi muscle
- 16 Buccinator muscle
- 17 Depressor anguli oris muscle
- 18 Mylohyoid muscle
- 19 Anterior belly of digastric muscle
- 20 Thyrohyoid muscle
- 21 Sternohyoid muscle
- 22 Omohyoid muscle
- 23 Hyoid bone
- 24 Sternothyroid muscle
- 25 Scalene muscles



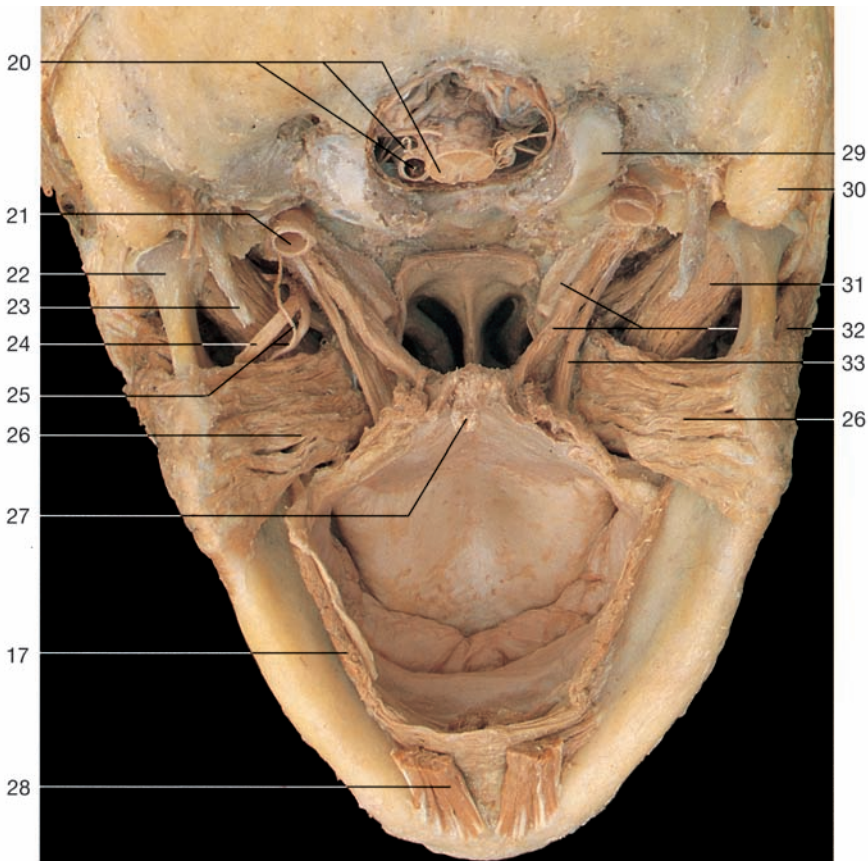
Supra- and infrahyoid muscles and pharynx (lateral aspect). Buccinator muscle removed; oral cavity opened.

- 1 External acoustic meatus
- 2 Tensor veli palatini muscle
- 3 Styloid process
- 4 Superior constrictor muscle of pharynx
- 5 Stylopharyngeus muscle (divided)
- 6 Middle constrictor muscle of pharynx
- 7 Sternocleidomastoid muscle
- 8 Greater horn of hyoid bone
- 9 Longus capitis muscle
- 10 Inferior constrictor muscle of pharynx
- 11 Temporal fascia
- 12 Tendon of temporal muscle
- 13 Orbicularis oculi muscle
- 14 Zygomatic arch
- 15 Lateral pterygoid plate
- 16 Parotid duct
- 17 Gingiva of upper jaw (without teeth) and buccinator muscle (divided)
- 18 Pterygomandibular raphe
- 19 Hyoglossus muscle
- 20 Mylohyoid muscle
- 21 Anterior belly of digastric muscle (hyoid bone)
- 22 Sternohyoid and thyrohyoid muscles
- 23 Omohyoid muscle

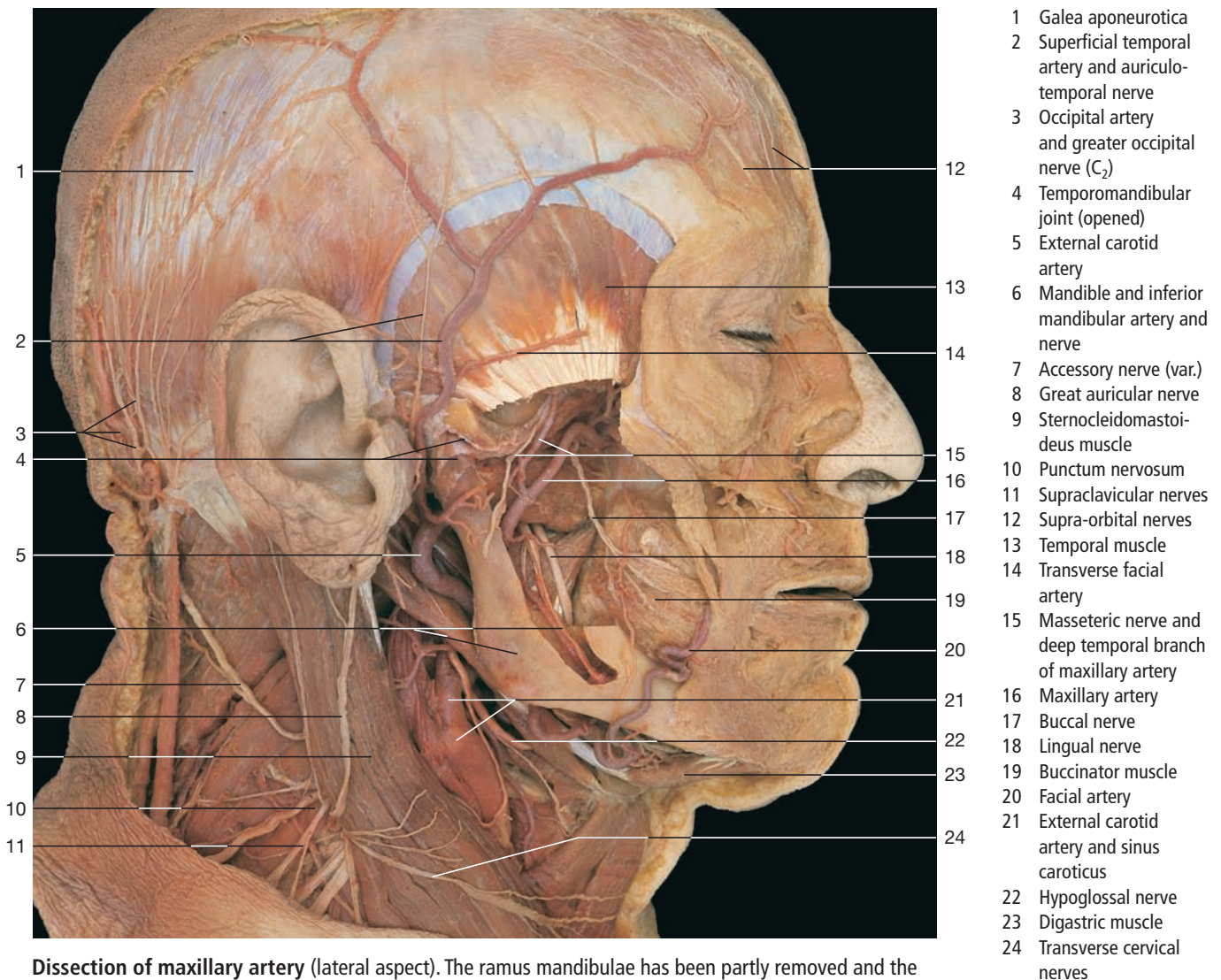


Coronal section through cranial, nasal, and oral cavities at the level of sphenoidal sinus.

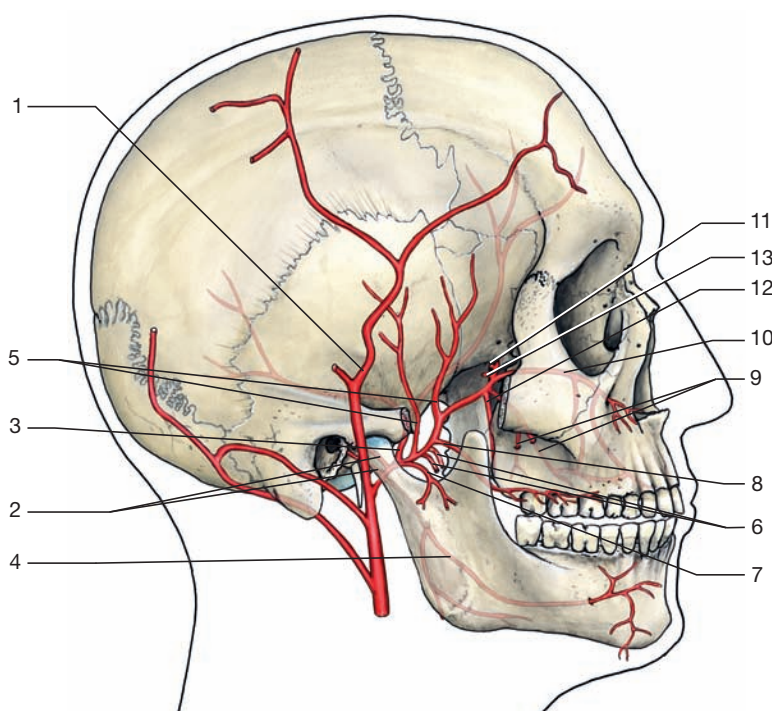
- 1 Temporal muscle
- 2 Sphenoidal sinus
- 3 Nasopharynx
- 4 Masseter muscle
- 5 Superior longitudinal, transverse and vertical muscles of tongue
- 6 Hyoglossus muscle
- 7 Geniohyoid muscle
- 8 Corpus callosum (caudate nucleus)
- 9 Optic nerve
- 10 Cavernous sinus
- 11 Zygomatic arch
- 12 Cross section of lateral pterygoid muscle and maxillary artery
- 13 Section of medial pterygoid muscle
- 14 Soft palate
- 15 Mandible and inferior alveolar nerve
- 16 Septum of the tongue
- 17 Mylohyoid muscle
- 18 Submandibular gland
- 19 Platysma muscle
- 20 Foramen magnum, vertebral artery and spinal cord
- 21 Internal carotid artery
- 22 Head of mandible
- 23 Styloid process
- 24 Inferior alveolar nerve
- 25 Lingual nerve and chorda tympani nerve
- 26 Medial pterygoid muscle
- 27 Uvula
- 28 Anterior belly of digastric muscle (cut)
- 29 Condyle of occipital bone
- 30 Mastoid process
- 31 Lateral pterygoid muscle
- 32 Auditory tube and levator veli palatini muscle
- 33 Tensor veli palatini muscle



Pterygoid and palatine muscles (posterior aspect).



Dissection of maxillary artery (lateral aspect). The ramus mandibulae has been partly removed and the canalis mandibulae has been opened.



Main branches of maxillary artery (lateral aspect).

1 Superficial temporal artery

Branches of the first part

- 2 Deep auricular artery and anterior tympanic artery
- 3 Middle meningeal artery
- 4 Inferior alveolar artery

Branches of the second part

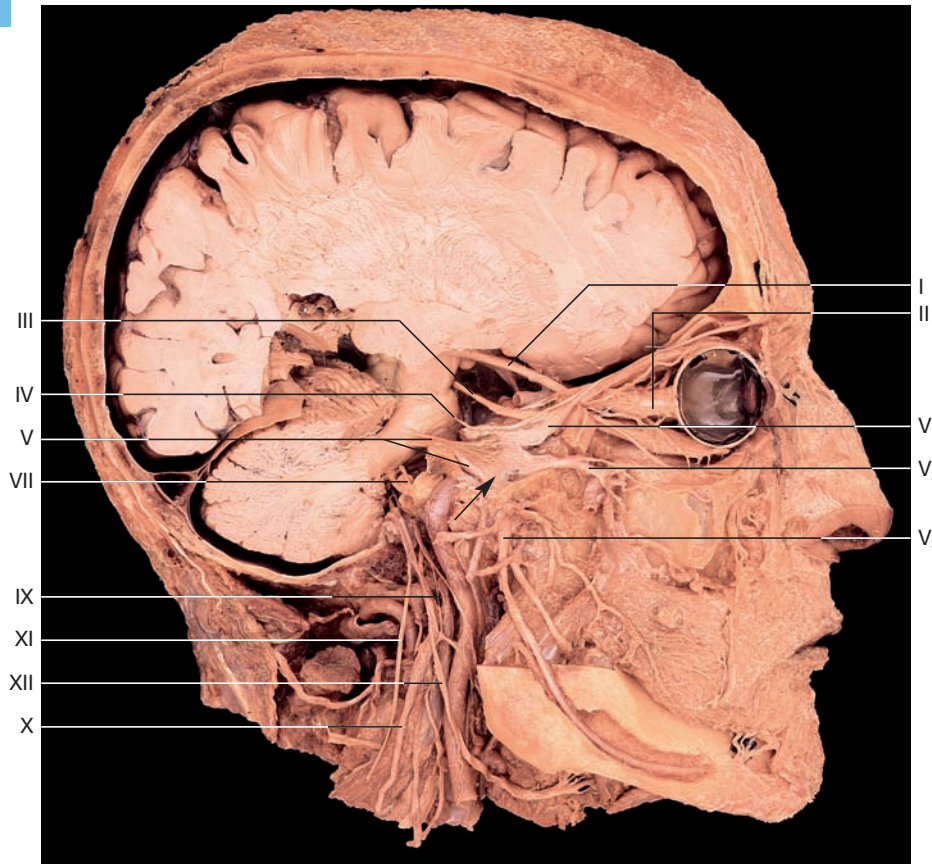
- 5 Deep temporal branches
- 6 Pterygoid branches
- 7 Masseteric artery
- 8 Buccal artery

Branches of the third part

- 9 Posterior superior alveolar artery
- 10 Infra-orbital artery
- 11 Sphenopalatine artery and branches to the nasal cavity
- 12 Descending palatine artery
- 13 Artery of the pterygoid canal



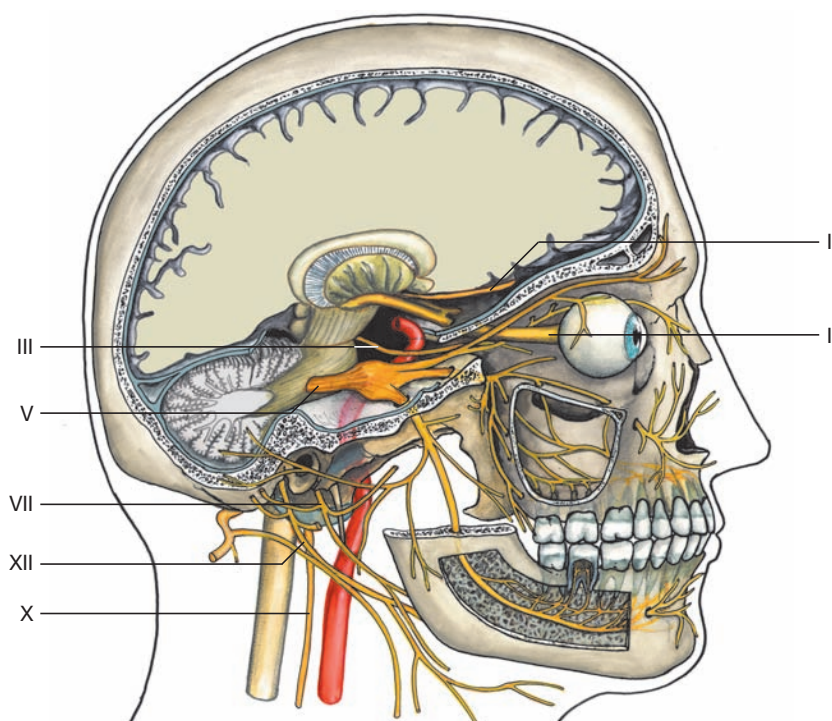
2.3 Brain and Regions of the Head



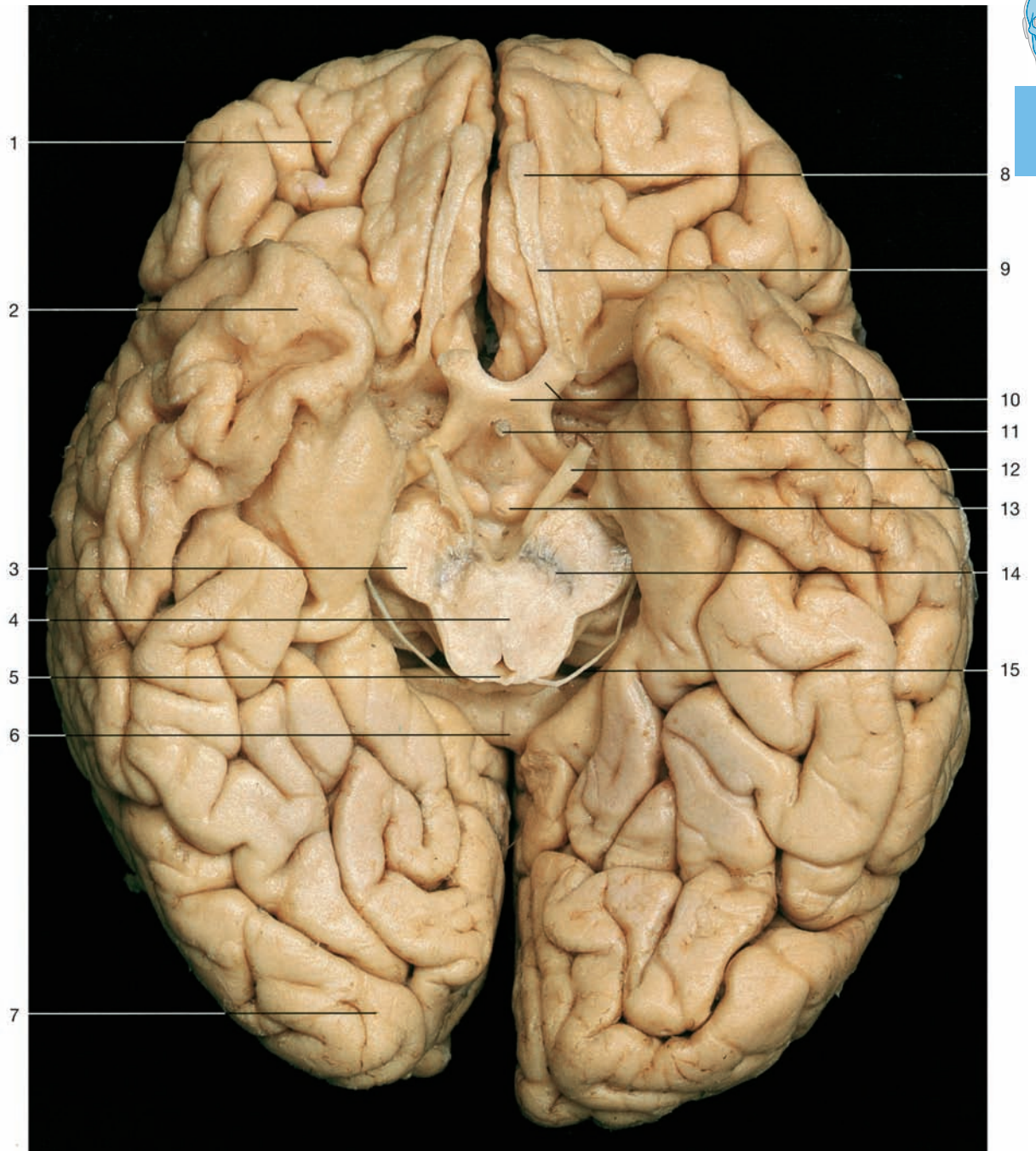
Cranial nerves

- I = Olfactory nerves
- II = Optic nerve
- III = Oculomotor nerve
- IV = Trochlear nerve
- V = Trigeminal nerve
- V₁ = Ophthalmic nerve
- V₂ = Maxillary nerve
- V₃ = Mandibular nerve
- VI = Abducent nerve
- VII = Facial nerve
- VIII = Vestibulocochlear nerve
- IX = Glossopharyngeal nerve
- X = Vagus nerve
- XI = Accessory nerve
- XII = Hypoglossal nerve

Dissection of the cranial nerves (indicated by I–XII) (lateral aspect). Brain, brain stem, and cerebellum have been partly removed. Arrow: trigeminal ganglion.



Schematic drawing of the cranial nerves (indicated by I–XII) (lateral aspect).



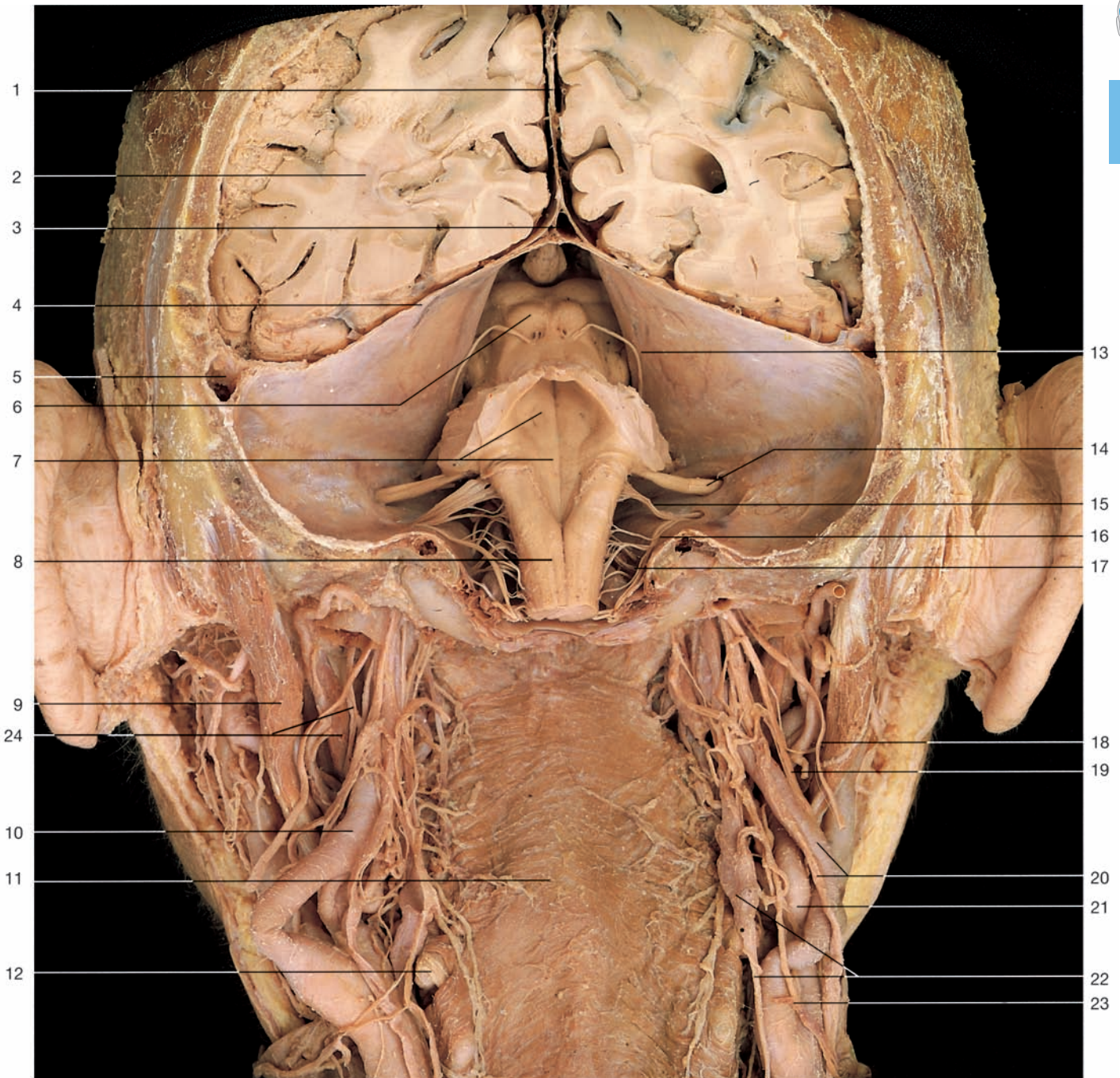
Brain with cranial nerves (inferior aspect). Midbrain divided.

- | | |
|-------------------------------|----------------------------------|
| 1 Frontal lobe | 9 Olfactory tract |
| 2 Temporal lobe | 10 Optic nerve and optic chiasma |
| 3 Pedunculus cerebri | 11 Infundibulum |
| 4 Midbrain (divided) | 12 Oculomotor nerve (n. III) |
| 5 Cerebral aqueduct | 13 Mamillary body |
| 6 Splenium of corpus callosum | 14 Substantia nigra |
| 7 Occipital lobe | 15 Trochlear nerve (n. IV) |
| 8 Olfactory bulb | |



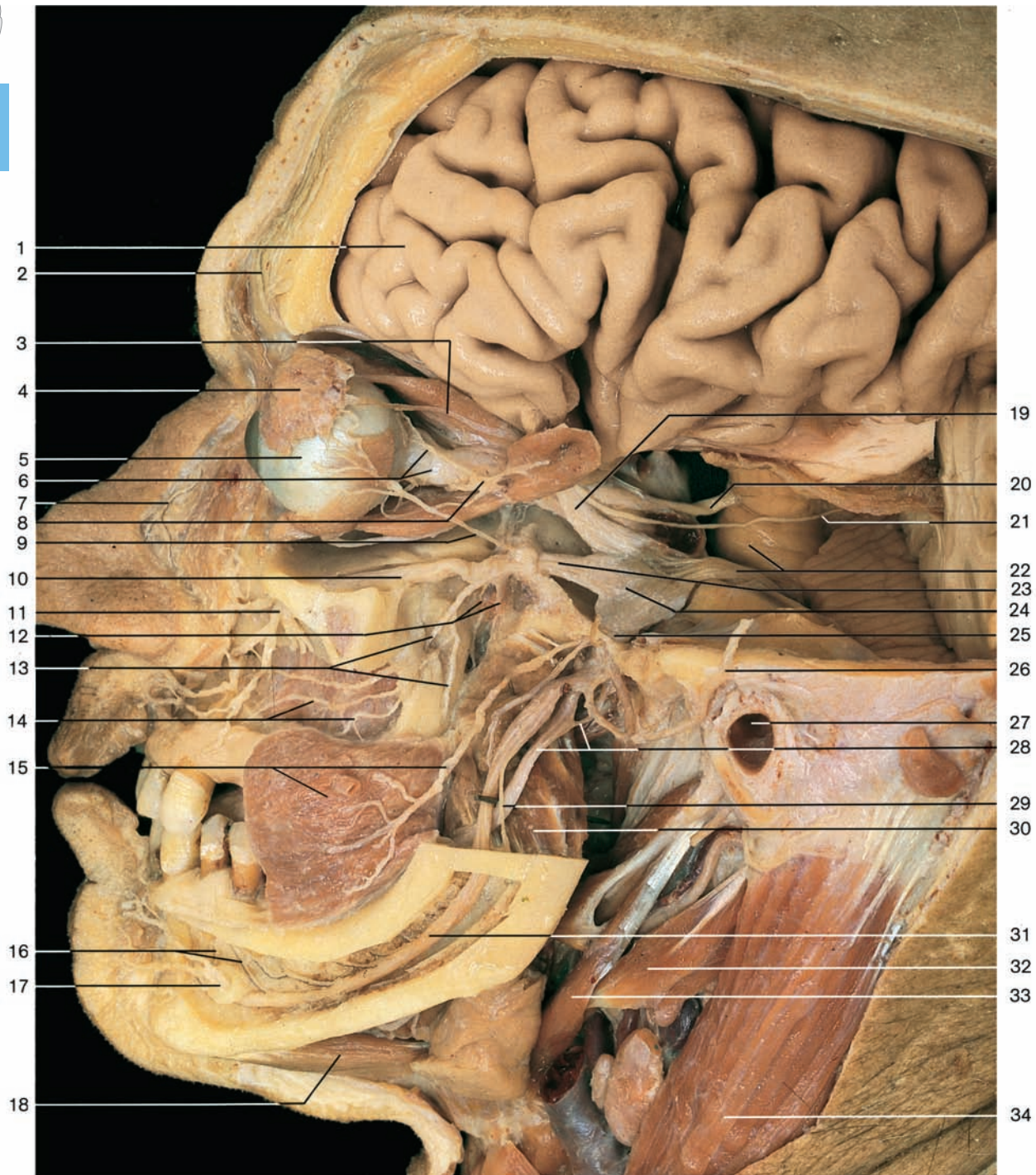
Brain with cranial nerves (inferior aspect). Meninges removed.

- | | | |
|--|--|--------------------------------------|
| 1 Olfactory sulcus (termination) | 12 Cervical spinal nerves | 23 Trochlear nerve (n. IV) |
| 2 Orbital gyri | 13 Cerebellum | 24 Trigeminal nerve (n. V) |
| 3 Temporal lobe | 14 Tonsil of cerebellum | 25 Facial nerve (n. VII) |
| 4 Straight gyrus | 15 Occipital lobe (posterior pole) | 26 Vestibulocochlear nerve (n. VIII) |
| 5 Olfactory trigone and inferior temporal sulcus | 16 Olfactory bulb | 27 Flocculus of cerebellum |
| 6 Medial occipitotemporal gyrus | 17 Orbital sulci of frontal lobe | 28 Glossopharyngeal nerve (n. IX) |
| 7 Parahippocampal gyrus, mamillary body, and interpeduncular fossa | 18 Olfactory tract | and vagus nerve (n. X) |
| 8 Pons and cerebral peduncle | 19 Optic nerve (n. II) and anterior perforated substance | 29 Hypoglossal nerve (n. XII) |
| 9 Abducent nerve (n. VI) | 20 Optic chiasma | 30 Accessory nerve (n. XI) |
| 10 Pyramid | 21 Optic tract | 31 Vermis of cerebellum |
| 11 Inferior olive | 22 Oculomotor nerve (n. III) | 32 Longitudinal fissure |



Brain stem and pharynx with cranial nerves (posterior aspect). Dissection of trochlear (n. IV), facial (n. VII), vestibulocochlear (n. VIII), glossopharyngeal (n. IX), vagus (n. X), accessory (n. XI), and hypoglossal (n. XII) nerves. The cranial cavity has been opened and the cerebellum removed.

- | | | |
|---------------------------------------|--|--|
| 1 Falx cerebri | 11 Pharynx (middle constrictor muscle) | 19 Hypoglossal nerve (n. XII) |
| 2 Occipital lobe | 12 Hyoid bone (greater horn) | 20 Vagus nerve (n. X) and internal carotid artery |
| 3 Straight sinus | 13 Trochlear nerve (n. IV) | 21 External carotid artery |
| 4 Cerebellar tentorium | 14 Facial nerve (n. VII) and vestibulocochlear nerve (n. VIII) | 22 Sympathetic trunk and superior cervical ganglion |
| 5 Transverse sinus | 15 Glossopharyngeal nerve (n. IX) and vagus nerve (n. X) | 23 Ansa cervicalis (superior root of hypoglossal nerve) |
| 6 Inferior colliculus of midbrain | 16 Accessory nerve (intracranial portion) (n. XI) | 24 Glossopharyngeal nerve (n. IX) and stylopharyngeus muscle |
| 7 Rhomboid fossa | 17 Hypoglossal nerve (intracranial portion) (n. XII) | |
| 8 Medulla oblongata | 18 Accessory nerve (n. XI) | |
| 9 Posterior belly of digastric muscle | | |
| 10 Internal carotid artery | | |

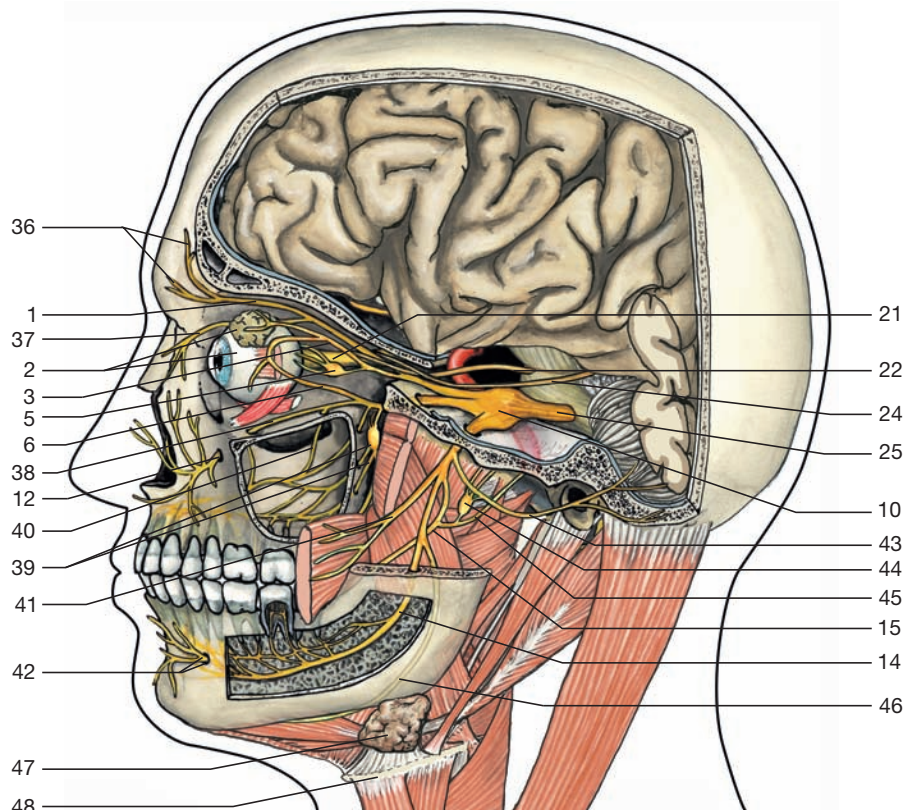


Dissection of the trigeminal nerve (n. V) in its entirety. Lateral wall of cranial cavity, lateral wall of orbit, zygomatic arch, and ramus of the mandible have been removed and the mandibular canal opened.

- | | | |
|---|--|--|
| 1 Frontal lobe of cerebrum | 12 Pterygopalatine ganglion and pterygopalatine nerves | 24 Trigeminal ganglion |
| 2 Supra-orbital nerve | 13 Posterior superior alveolar nerves | 25 Mandibular nerve (n. V ₃) |
| 3 Lacrimal nerve | 14 Superior dental plexus | 26 Auriculotemporal nerve |
| 4 Lacrimal gland | 15 Buccinator muscle and buccal nerve | 27 External acoustic meatus (divided) |
| 5 Eyeball | 16 Inferior dental plexus | 28 Lingual nerve and chorda tympani |
| 6 Optic nerve and short ciliary nerves | 17 Mental foramen and mental nerve | 29 Mylohyoid nerve |
| 7 External nasal branch of anterior ethmoidal nerve | 18 Anterior belly of digastric muscle | 30 Medial pterygoid muscle |
| 8 Ciliary ganglion | 19 Ophthalmic nerve (n. V ₁) | 31 Inferior alveolar nerve |
| 9 Zygomatic nerve | 20 Oculomotor nerve (n. III) | 32 Posterior belly of digastric muscle |
| 10 Infra-orbital nerve | 21 Trochlear nerve (n. IV) | 33 Stylohyoid muscle |
| 11 Infra-orbital foramen and terminal branches of infra-orbital nerve | 22 Trigeminal nerve (n. V) and pons | 34 Sternocleidomastoid muscle |
| | 23 Maxillary nerve (n. V ₂) | |



Cranial nerves in connection with the brain stem. Left side (lateral superior aspect). Left half of brain and head partly removed. Notice the location of the trigeminal ganglion.



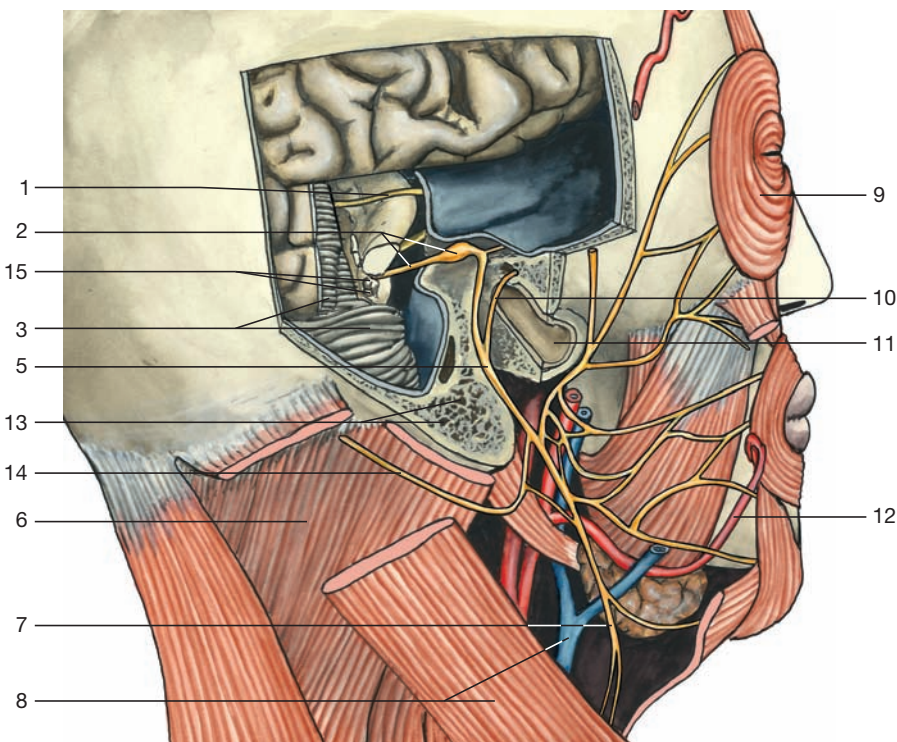
Main branches of trigeminal nerve (compare with the dissection on opposite page).

- 1 Frontal nerve
- 2 Lacrimal gland and eyeball
- 3 Lacrimal nerve
- 4 Lateral rectus muscle
- 5 Ciliary ganglion lateral to optic nerve
- 6 Zygomatic nerve
- 7 Inferior branch of oculomotor nerve
- 8 Ophthalmic nerve (n. V₁)
- 9 Maxillary nerve (n. V₂)
- 10 Trigeminal ganglion
- 11 Mandibular nerve (n. V₃)
- 12 Posterior superior alveolar nerves
- 13 Tympanic cavity, external acoustic meatus, and tympanic membrane
- 14 Inferior alveolar nerve
- 15 Lingual nerve
- 16 Facial nerve (n. VII)
- 17 Vagus nerve (n. X)
- 18 Hypoglossal nerve (n. XII) and superior root of ansa cervicalis
- 19 External carotid artery
- 20 Olfactory tract (n. I)
- 21 Optic nerve (n. II) (intracranial part)
- 22 Oculomotor nerve (n. III)
- 23 Abducent nerve (n. VI)
- 24 Trochlear nerve (n. IV)
- 25 Trigeminal nerve (n. V)
- 26 Vestibulocochlear nerve (n. VIII) and facial nerve (n. VII)
- 27 Glossopharyngeal nerve (n. IX) (leaving brain stem)
- 28 Rhomboid fossa
- 29 Vagus nerve (n. X) (leaving brain stem)
- 30 Hypoglossal nerve (n. XII) (leaving medulla oblongata)
- 31 Accessory nerve (n. XI) (ascending from foramen magnum)
- 32 Vertebral artery
- 33 Spinal ganglion and dura mater of spinal cord
- 34 Accessory nerve (n. XI)
- 35 Internal carotid artery
- 36 Lateral and medial branch of supra-orbital nerve
- 37 Infratrochlear nerve
- 38 Infra-orbital nerve
- 39 Pterygopalatine ganglion and pterygopalatine nerves
- 40 Middle superior alveolar nerves (entering superior dental plexus)
- 41 Buccal nerve
- 42 Mental nerve and mental foramen
- 43 Auriculotemporal nerve
- 44 Otic ganglion
- 45 Chorda tympani
- 46 Mylohyoid nerve
- 47 Submandibular gland
- 48 Hyoid bone



Dissection of the facial nerve (n. VII) in its entirety. Cranial cavity fenestrated, temporal lobe partly removed. Facial canal and tympanic cavity opened, posterior wall of external acoustic meatus removed.

Branches of the facial nerve: a = temporal branch; b = zygomatic branches; c = buccal branches; d = marginal mandibular branch.

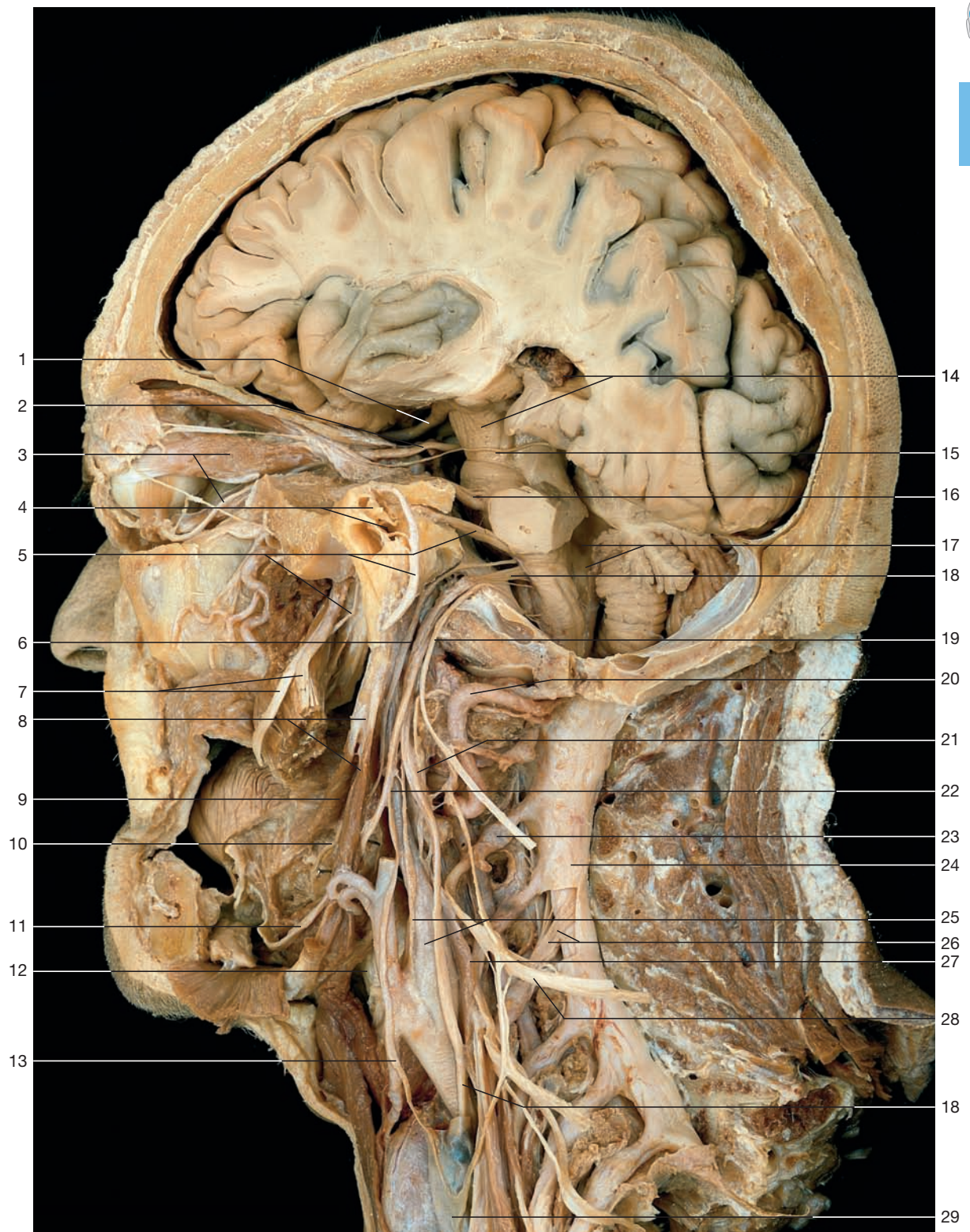


Facial nerve (compare with the dissection above).

- 1 Trochlear nerve (n. IV)
- 2 Facial nerve (n. VII) with geniculate ganglion
- 3 Cerebellum (right hemisphere)
- 4 Occipital belly of occipitofrontalis muscle and greater occipital nerve
- 5 Facial nerve (n. VII) at stylomastoid foramen
- 6 Splenius capitis muscle
- 7 Cervical branch of facial nerve (n. VII)
- 8 Sternocleidomastoid muscle and retromandibular vein
- 9 Orbicularis oculi muscle
- 10 Chorda tympani
- 11 External acoustic meatus
- 12 Facial artery
- 13 Mastoid air cells
- 14 Posterior auricular nerve
- 15 Nucleus and genu of facial nerve

Cranial nerves in connection with the brain stem (oblique-lateral aspect).

Lateral portion of the skull, brain, neck and facial structures, lateral wall of orbit and oral cavity have been removed. The tympanic cavity has been opened. The mandible has been divided and the muscles of mastication have been removed.

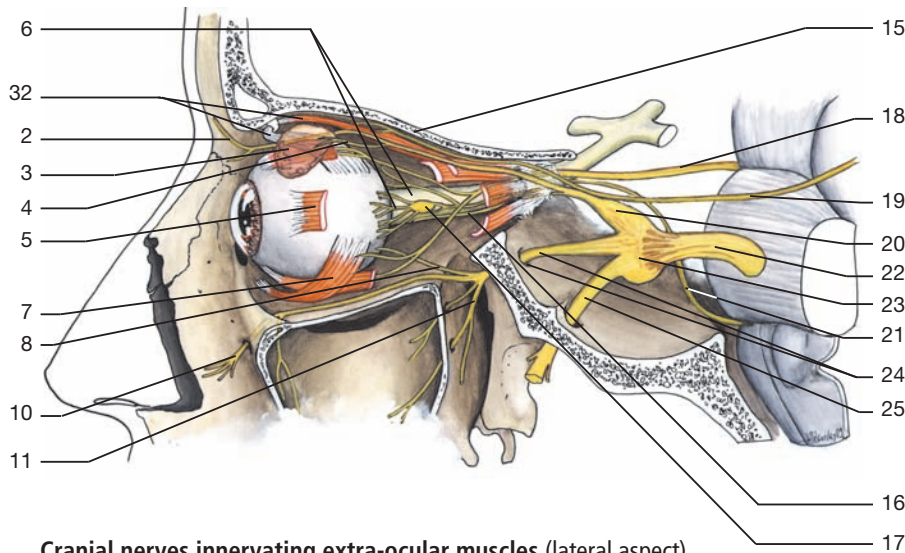


- | | | |
|--|---|---|
| 1 Optic tract | 11 Lingual branch of hypoglossal nerve | 22 Hypoglossal nerve (n. XII) |
| 2 Oculomotor nerve (n. III) | 12 External carotid artery | 23 Spinal ganglion with dural sheath |
| 3 Lateral rectus muscle and inferior branch of oculomotor nerve | 13 Superior root of ansa cervicalis (branch of hypoglossal nerve, derived from C ₁) | 24 Dura mater of spinal cord |
| 4 Malleus and chorda tympani | 14 Lateral ventricle with choroid plexus and cerebral peduncle | 25 Internal carotid artery and carotid sinus branch of glossopharyngeal nerve |
| 5 Chorda tympani, facial nerve (n. VII), and vestibulocochlear nerve (n. VIII) | 15 Trochlear nerve (n. IV) | 26 Dorsal roots of spinal nerve |
| 6 Glossopharyngeal nerve (n. IX) | 16 Trigeminal nerve (n. V) | 27 Sympathetic trunk |
| 7 Lingual nerve and inferior alveolar nerve | 17 Fourth ventricle and rhomboid fossa | 28 Branch of cervical plexus (ventral primary ramus of third cervical spinal nerve) |
| 8 Styloid process and stylohyoid muscle | 18 Vagus nerve (n. X) | 29 Ansa cervicalis |
| 9 Styloglossus muscle | 19 Accessory nerve (n. XI) | |
| 10 Lingual branches of glossopharyngeal nerve | 20 Vertebral artery | |
| | 21 Superior cervical ganglion | |

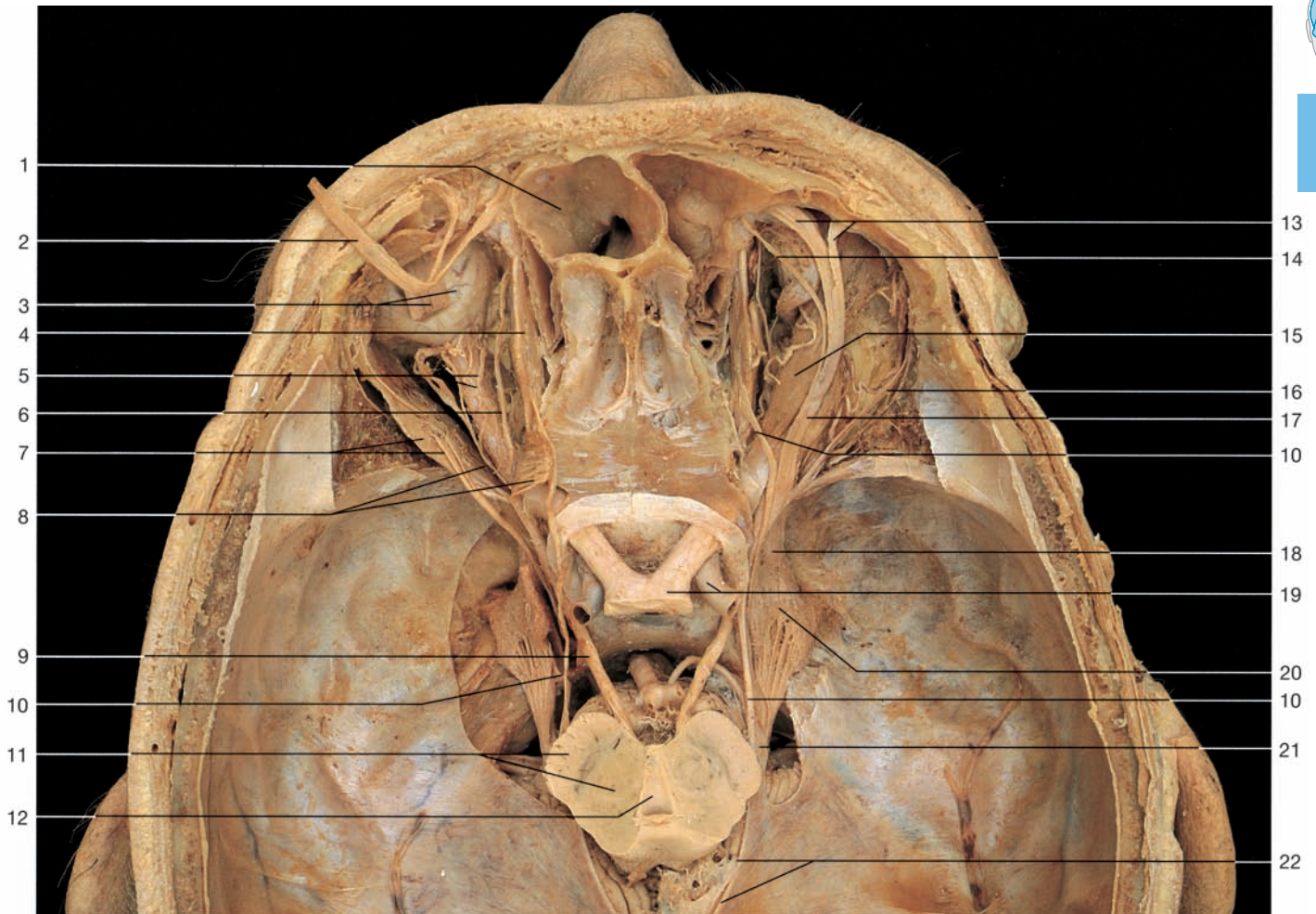


Cranial nerves of the orbit and pterygopalatine fossa (left orbit, lateral aspect). Dissection of optic (n. II), oculomotor (n. III), trochlear (n. IV), ophthalmic (n. V₁), and abducent (n. VI) nerves. Note the zygomaticolacrimal anastomosis (arrow).

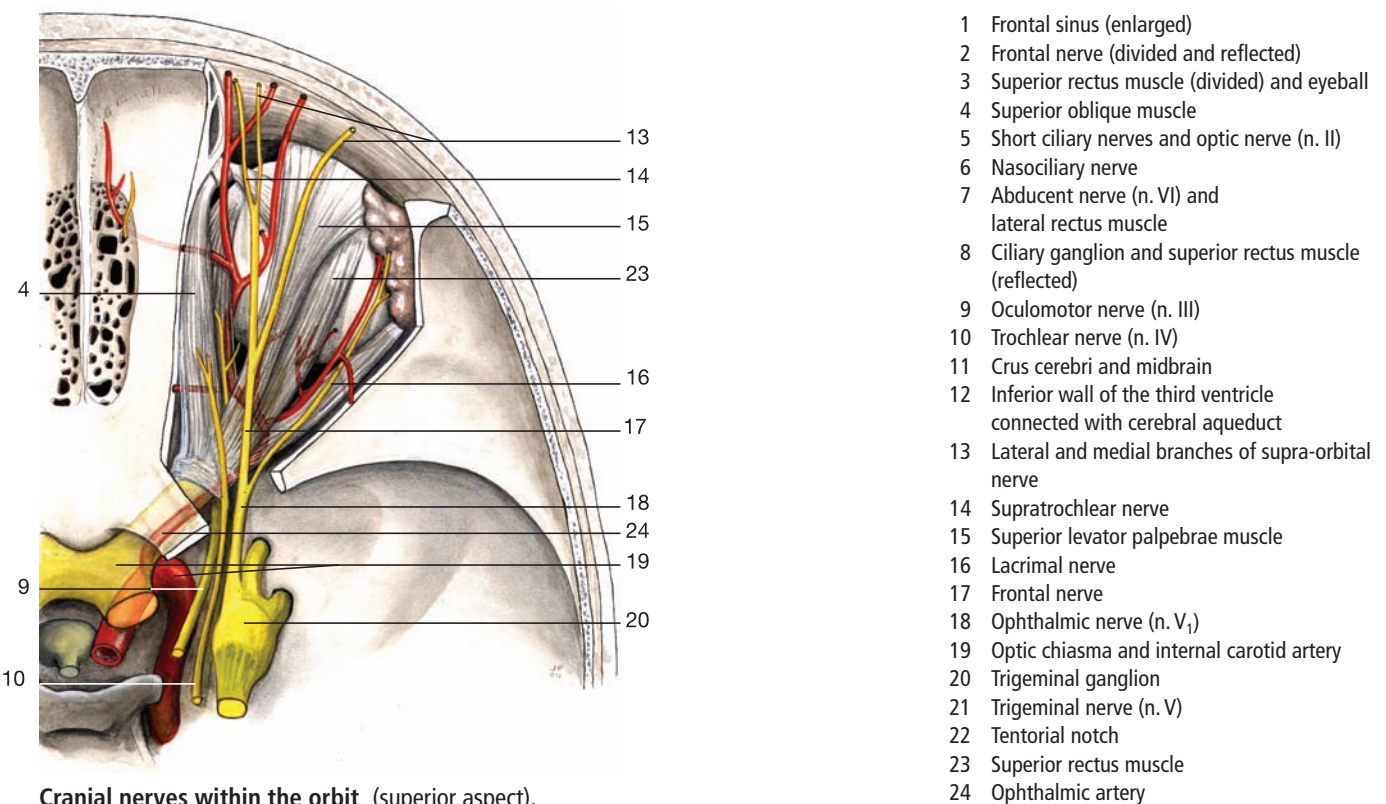
- | | | |
|-----------------------------------|---|--|
| 1 Frontal lobe | 6 Optic nerve (n. II) and short ciliary nerves | 10 Infra-orbital nerve |
| 2 Supra-orbital nerve | 7 Inferior oblique muscle | 11 Posterior superior alveolar nerves |
| 3 Lacrimal gland | 8 Zygomatic nerve | 12 Branches of superior alveolar plexus adjacent to mucous membrane of maxillary sinus |
| 4 Lacrimal nerve | 9 Inferior branch of oculomotor nerve (n. III) and inferior rectus muscle | 13 Central sulcus of insula |
| 5 Lateral rectus muscle (divided) | | 14 Superior rectus muscle |
| | | 15 Periorbital (roof of orbit) |
| | | 16 Nasociliary nerve |
| | | 17 Ciliary ganglion |
| | | 18 Oculomotor nerve (n. III) |
| | | 19 Trochlear nerve (n. IV) |
| | | 20 Ophthalmic nerve (n. V ₁) |
| | | 21 Abducent nerve (n. VI) (divided) |
| | | 22 Trigeminal nerve (n. V) |
| | | 23 Trigeminal ganglion |
| | | 24 Maxillary nerve (n. V ₂) and foramen rotundum |
| | | 25 Mandibular nerve (n. V ₃) |
| | | 26 External acoustic meatus |
| | | 27 Pterygopalatine nerves |
| | | 28 Deep temporal nerves |
| | | 29 Buccal nerve |
| | | 30 Masseteric nerve |
| | | 31 Auriculotemporal nerve |
| | | 32 Trochlea and superior oblique muscle |



Cranial nerves innervating extra-ocular muscles (lateral aspect).



Cranial nerves of the orbit (superior aspect). Right side: superficial layer, left side: middle layer of the orbit. Superior rectus muscle and frontal nerve divided and reflected. Tentorium and dura mater partly removed.



Cranial nerves within the orbit (superior aspect).



Base of the skull with cranial nerves. The brain stem was divided and the tentorium fenestrated. Both hemispheres were removed.



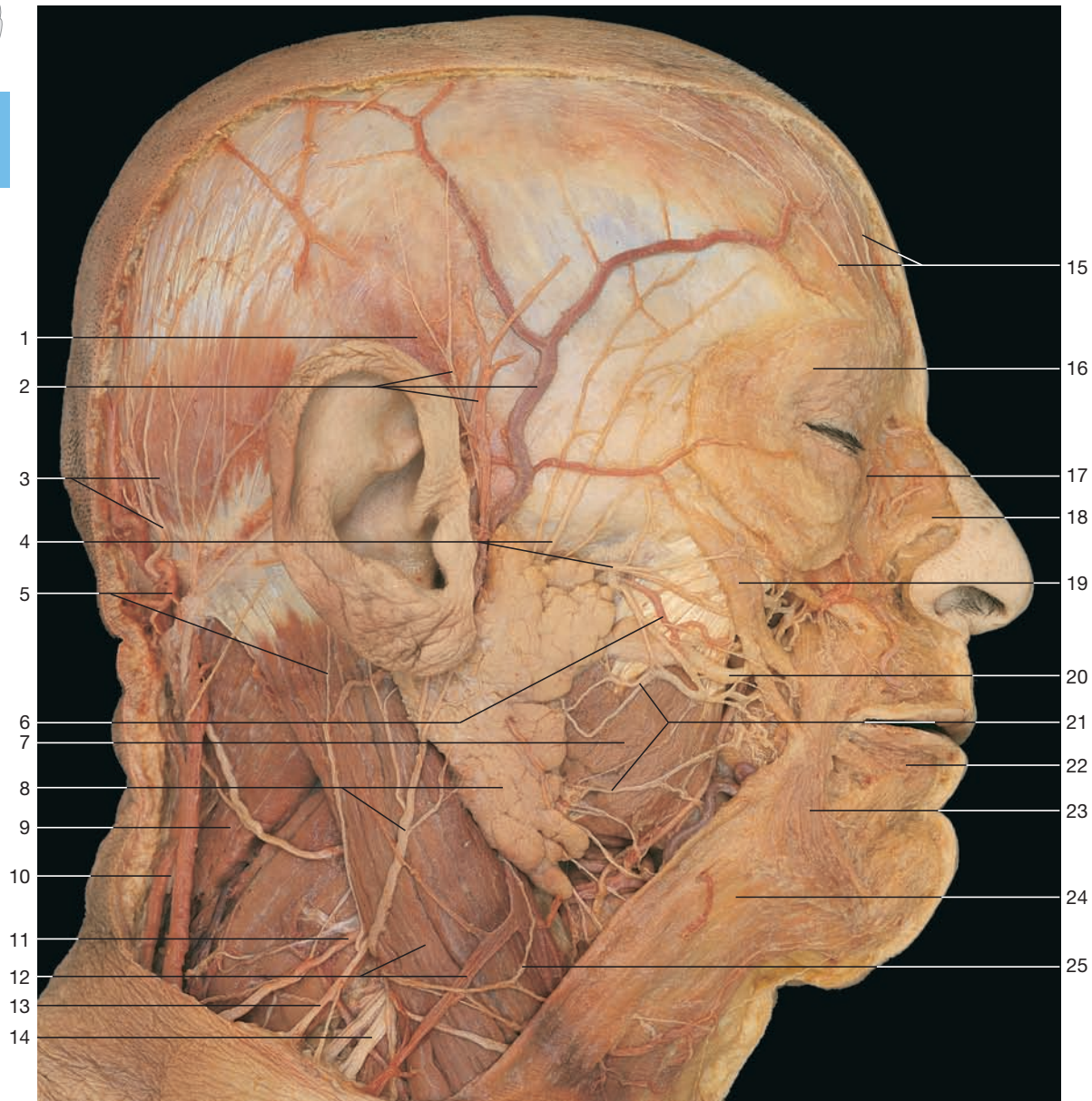
- 1 Infundibulum
- 2 Optic chiasma and internal carotid artery
- 3 Olfactory tract
- 4 Oculomotor nerve (n. III)
- 5 Ophthalmic nerve (n. V₁)
- 6 Trigeminal ganglion
- 7 Falx cerebri
- 8 Tentorial notch
- 9 Trochlear nerve (n. IV)
- 10 Trigeminal nerve (n. V)
- 11 Cerebellum
- 12 Eyeball
- 13 Medial and lateral rectus muscles
- 14 Internal carotid artery
- 15 Oculomotor nerve (n. III)
- 16 Midbrain
- 17 Cerebral aqueduct
- 18 Vermis of cerebellum
- 19 Occipital lobe of the cerebellum

Axial section through the head at the level of the sella turcica demonstrating cranial nerves (MRI scan). (Dept. of Neurosurgery, Univ. Erlangen-Nuremberg, Germany.)

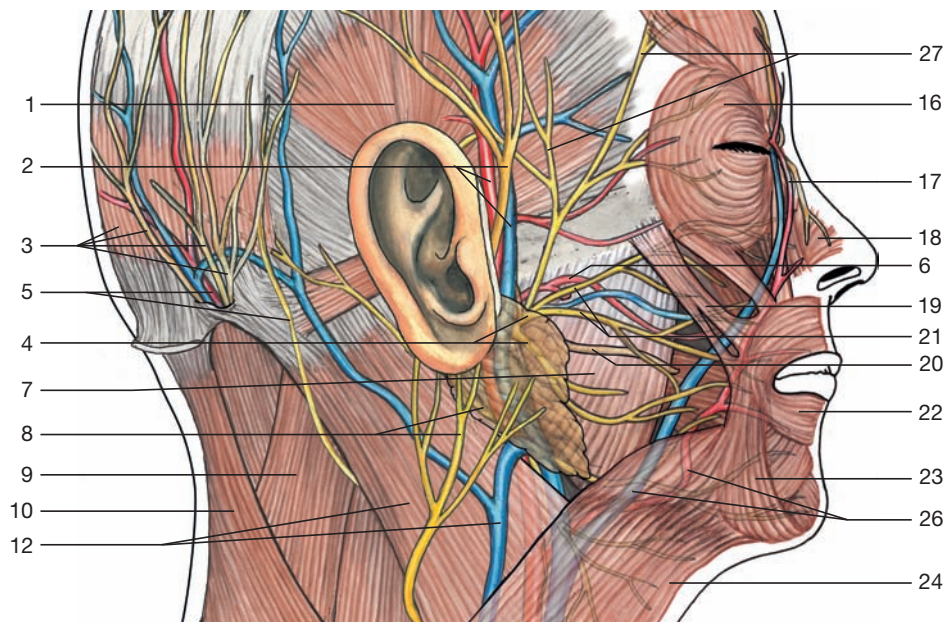


Base of the skull with cranial nerves (internal aspect). Both cerebral hemispheres and upper part of the brain stem have been removed. Incision on the right cerebellar tentorium to display the cranial nerves of the infratentorial space.

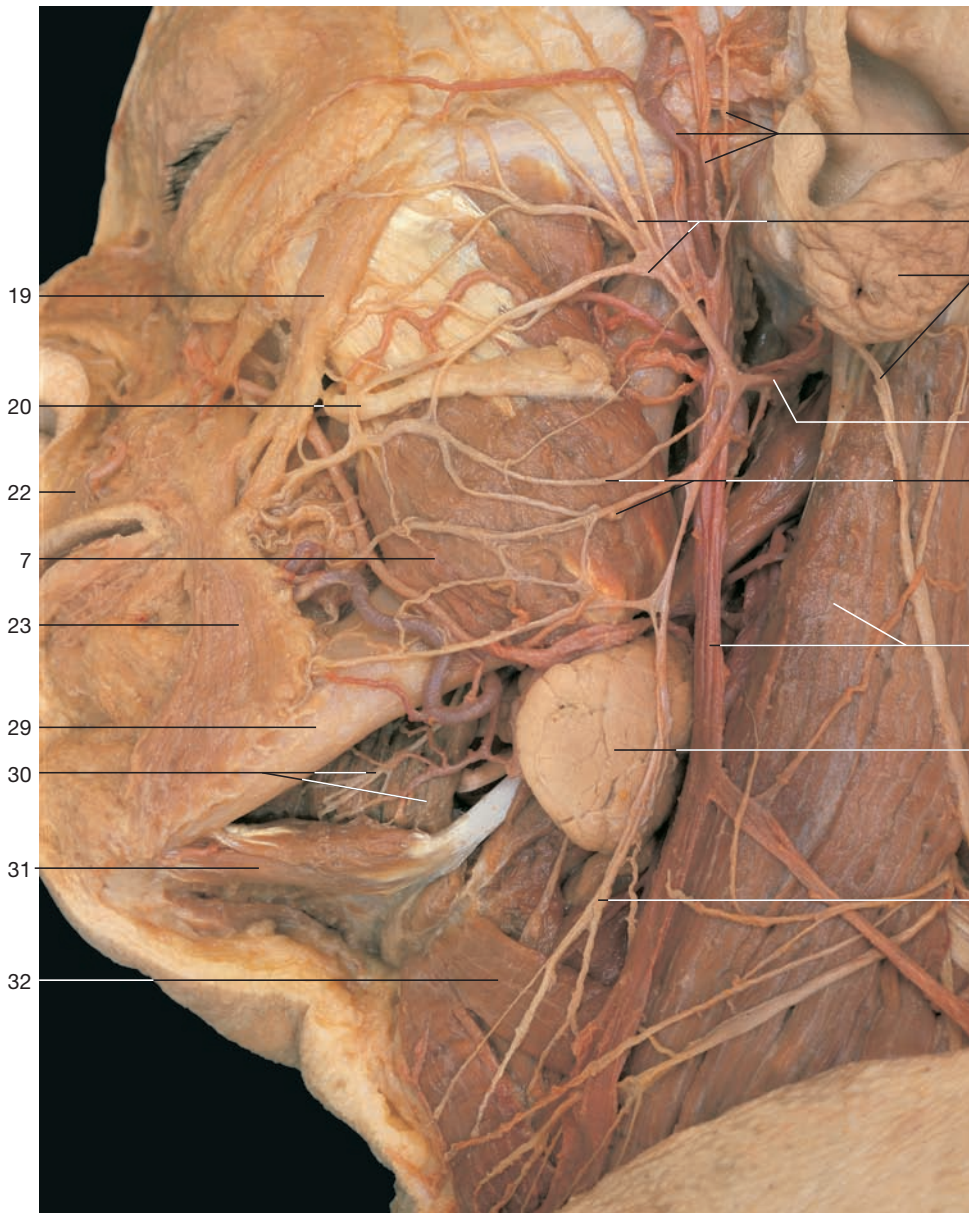
- | | |
|--|---|
| 1 Superior sagittal sinus with falx cerebri | 12 Hypophysial fossa, infundibulum, and diaphragma sellae |
| 2 Olfactory bulb | 13 Dorsum sellae |
| 3 Olfactory tract | 14 Midbrain (divided) |
| 4 Optic nerve and internal carotid artery | 15 Trigeminal nerve (n. V) |
| 5 Anterior clinoid process and anterior attachment of cerebellar tentorium | 16 Facial nerve (n. VII), nervus intermedius, and vestibulocochlear nerve (n. VIII) |
| 6 Oculomotor nerve (n. III) | 17 Cerebral aqueduct |
| 7 Abducent nerve (n. VI) | 18 Right hemisphere of cerebellum |
| 8 Tentorial notch (incisura tentorii) | 19 Vermis of cerebellum |
| 9 Trochlear nerve (n. IV) | 20 Straight sinus |
| 10 Cerebellar tentorium | |
| 11 Falx cerebri and confluence of sinuses | |



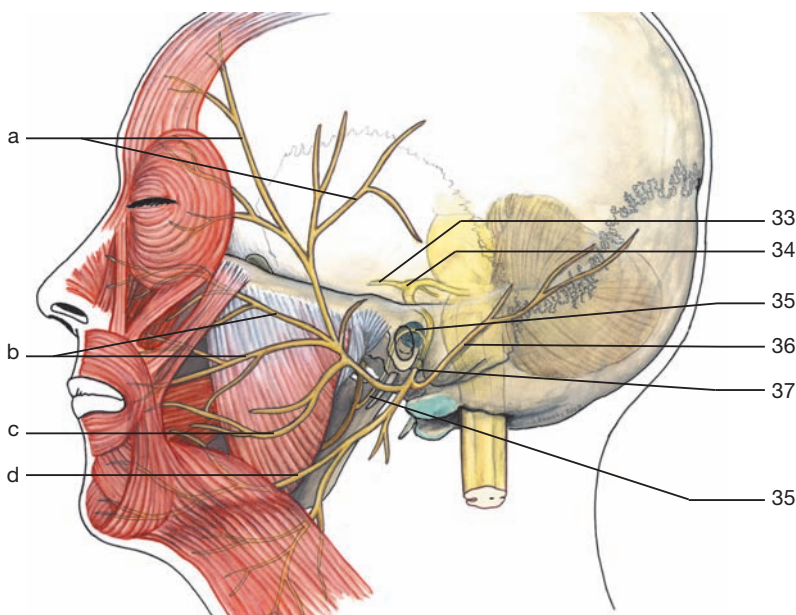
Superficial dissection of lateral region of the face. Peripheral distribution of facial nerve (n. VII).



Superficial region of the face. Note the facial plexus within the parotid gland (lateral aspect).



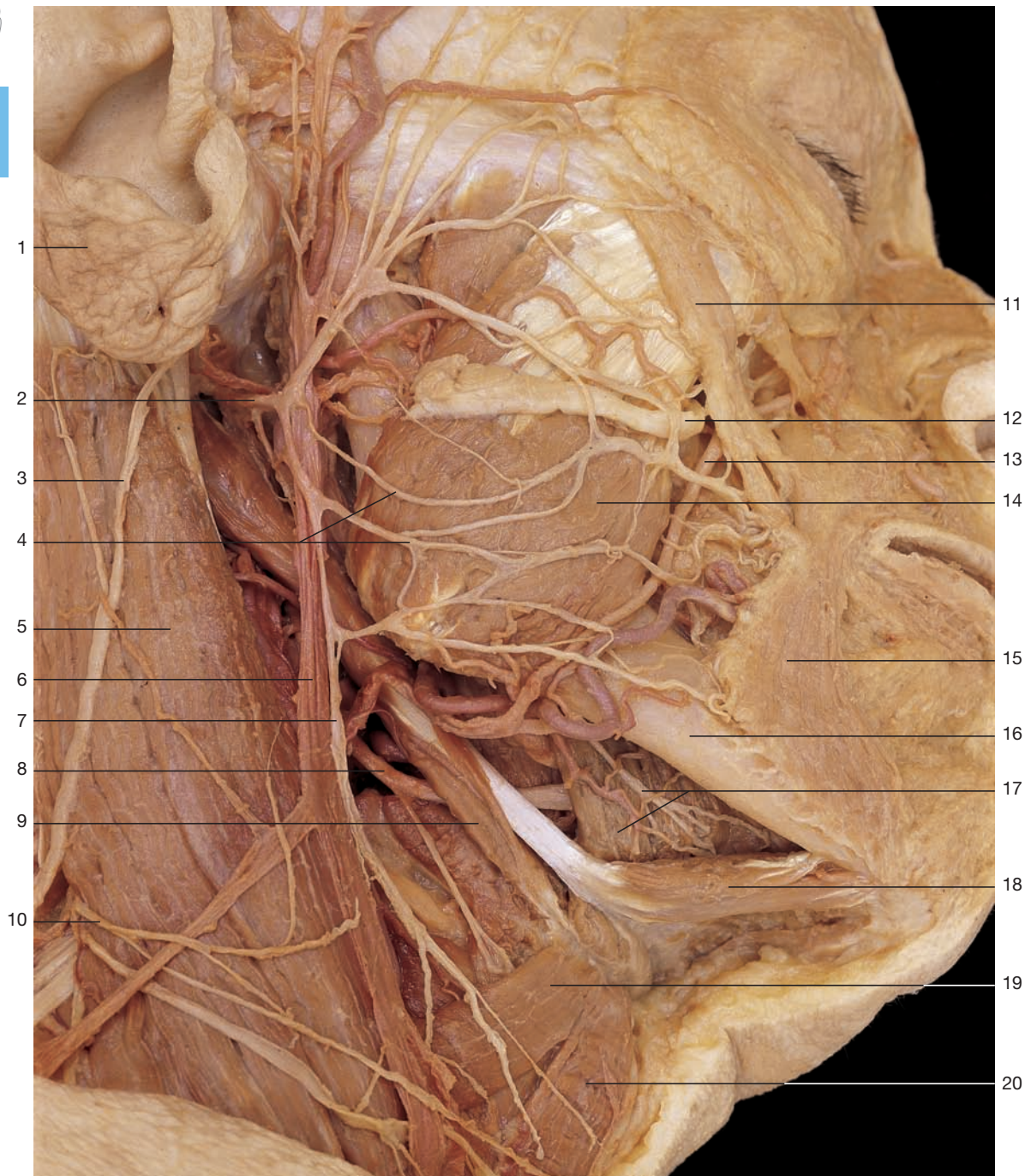
Deep dissection of facial nerve. Retromandibular and submandibular regions (lateral aspect).
The parotid gland has been removed.



Main branches of facial nerve (lateral aspect).

a = temporal branches; b = zygomatic branches;
c = buccal branches; d = marginal mandibular branch.

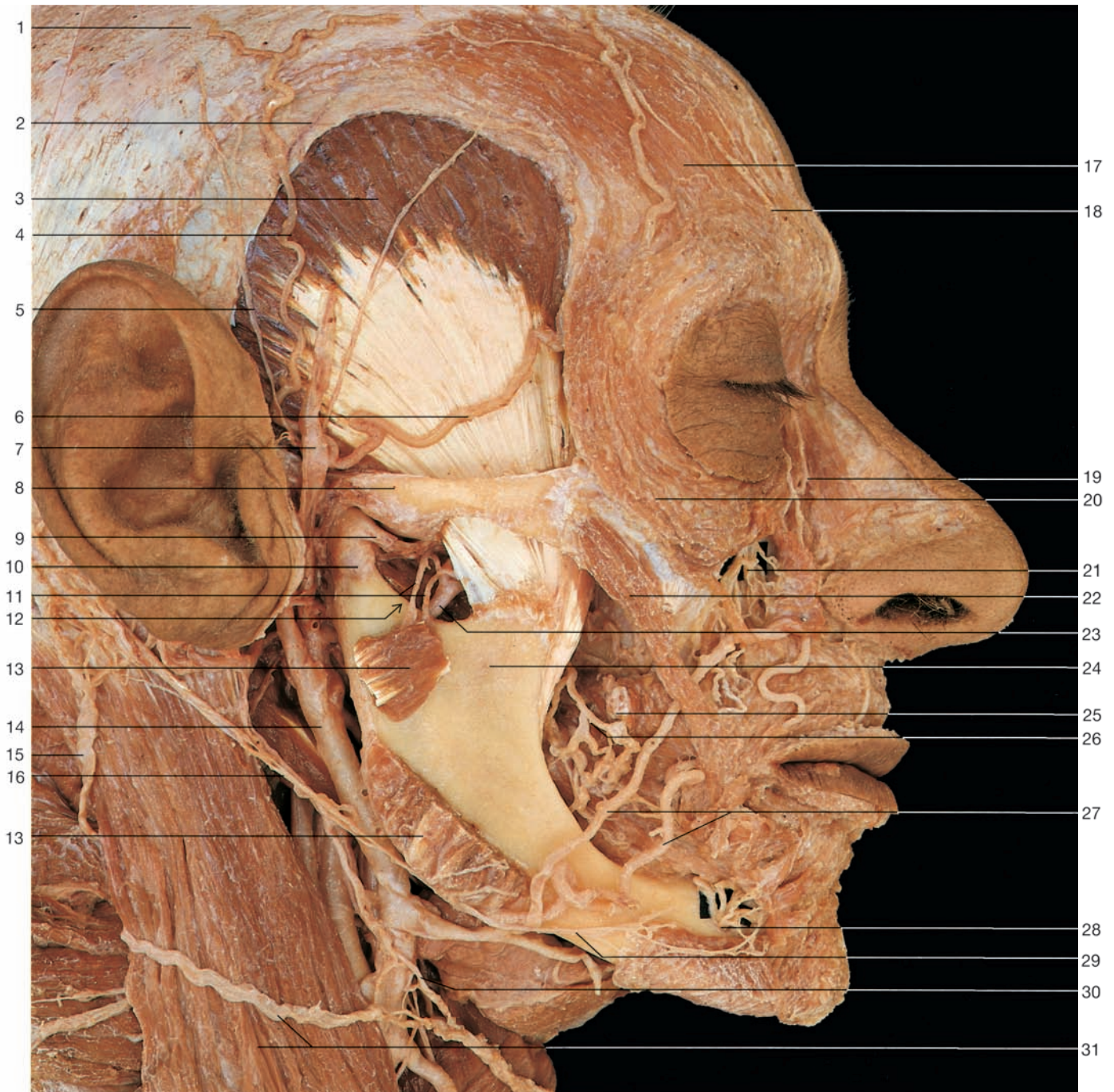
- 1 Temporoparietalis muscle
- 2 Superficial temporal artery and vein, and auriculotemporal nerve
- 3 Occipital belly of occipitofrontalis muscle and greater occipital nerve (C₂)
- 4 Facial nerve (n. VII)
- 5 Lesser occipital nerve and occipital artery
- 6 Transverse facial artery
- 7 Masseter muscle
- 8 Parotid gland and great auricular nerve
- 9 Splenius capitis muscle
- 10 Trapezius muscle
- 11 Punctum nervosum, point of distribution of cutaneous nerves of cervical plexus
- 12 Sternocleidomastoid muscle and external jugular vein
- 13 Supraclavicular nerves
- 14 Brachial plexus
- 15 Supra-orbital nerves
- 16 Orbicularis oculi muscle
- 17 Angular artery (terminal branch of facial artery)
- 18 Nasalis muscle
- 19 Zygomaticus major muscle
- 20 Parotid duct
- 21 Zygomatic and buccal branches of facial nerve
- 22 Orbicularis oris muscle
- 23 Depressor anguli oris muscle
- 24 Platysma muscle
- 25 Cervical branch of facial nerve (anastomosing with transverse cervical nerve of cervical plexus)
- 26 Facial artery and vein
- 27 Temporal branches of facial nerve
- 28 Submandibular gland
- 29 Mandible
- 30 Mylohyoid muscle and nerve
- 31 Anterior belly of digastric muscle
- 32 Omohyoid muscle
- 33 Greater petrosal nerve
- 34 Geniculate ganglion
- 35 Chorda tympani
- 36 Posterior auricular nerve
- 37 Stylomastoid foramen
- 38 Sternocleidomastoid muscle and retromandibular vein



Deep dissection of facial nerve. Retromandibular and submandibular regions (lateral aspect).

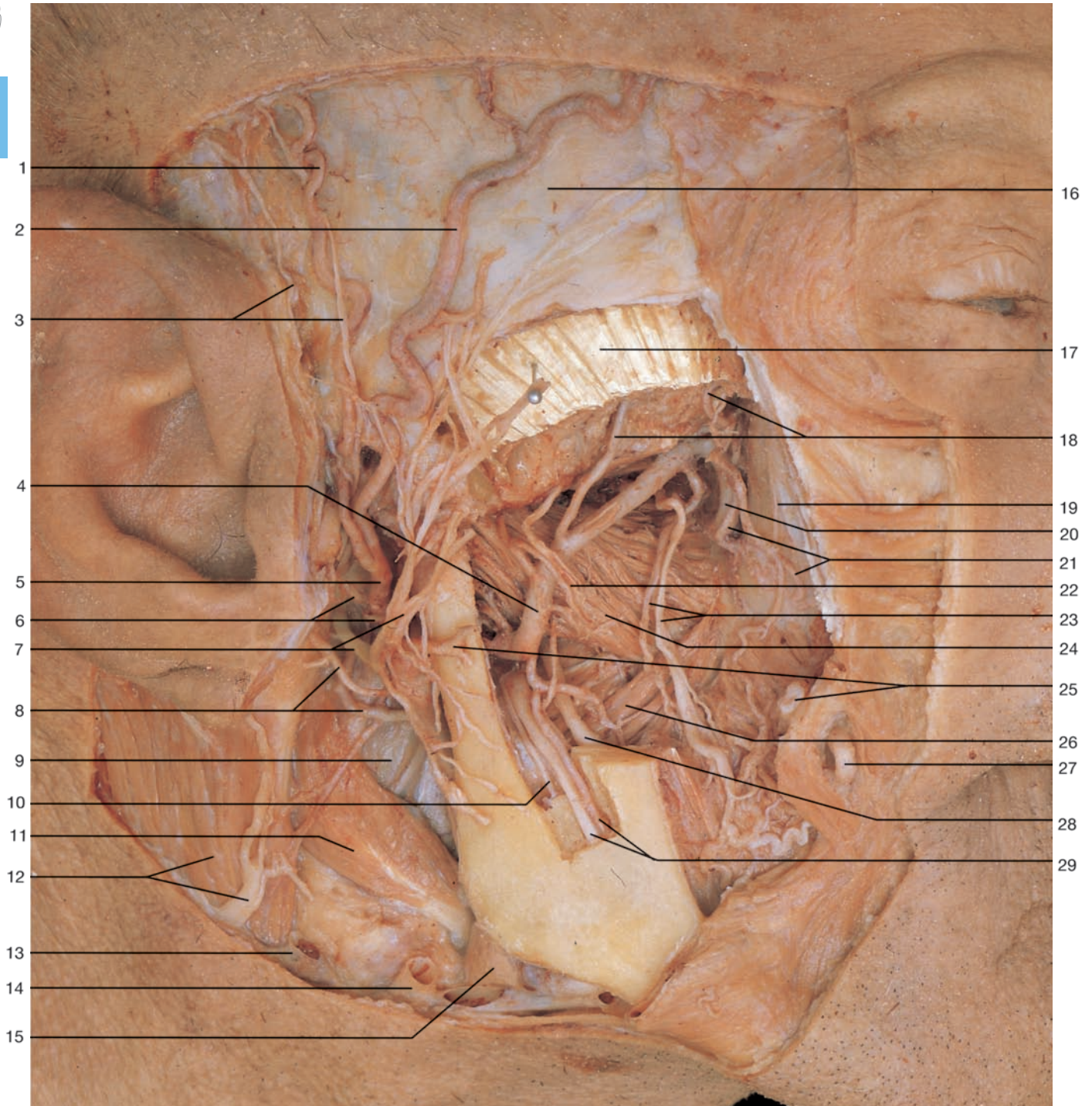
The parotid gland and the submandibular gland have been removed. The parotid plexus (4) is formed by anastomosis of the temporal, zygomatic, buccal, marginal mandibular, and cervical branches of the facial nerve, arising in the parotid gland.

- | | | |
|-----------------------------------|------------------------------|---------------------------------------|
| 1 Parotid gland | 8 Hypoglossal nerve (n. XII) | 15 Depressor anguli oris muscle |
| 2 Facial nerve (n. VII) | 9 Stylohyoid muscle | 16 Mandible |
| 3 Great auricular nerve | 10 Transverse cervical nerve | 17 Mylohyoid muscle and nerve |
| 4 Parotid plexus | 11 Zygomaticus major muscle | 18 Anterior belly of digastric muscle |
| 5 Sternocleidomastoid muscle | 12 Parotid duct | 19 Omohyoid muscle |
| 6 Retromandibular vein | 13 Facial artery | 20 Sternohyoid muscle |
| 7 Cervical branch of facial nerve | 14 Masseter muscle | |



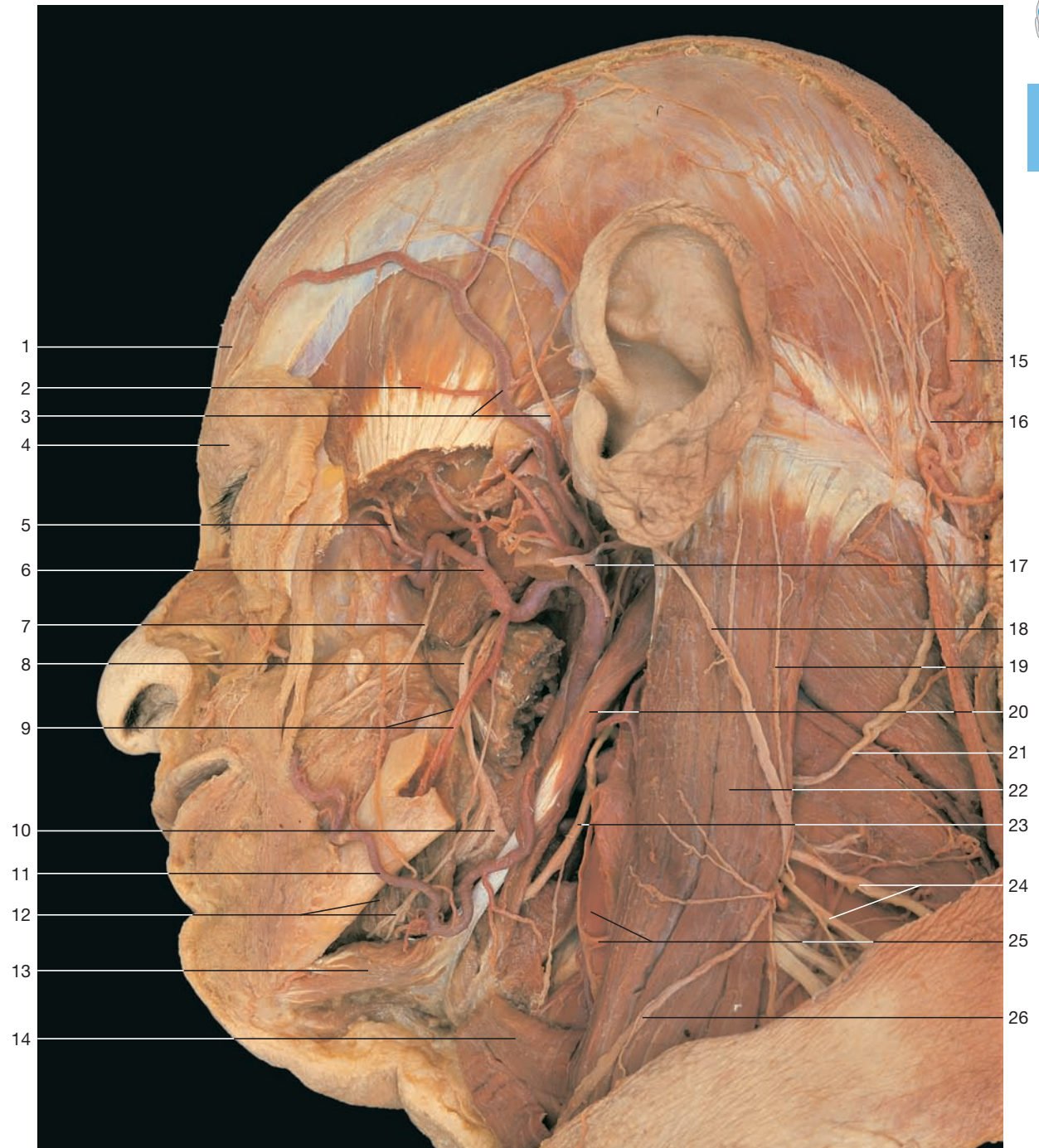
Superficial dissection of lateral region of the face. Masseter muscle and temporal fascia have been partly removed to display the masseteric artery and nerve.

- | | | |
|--|--|--|
| 1 Galea aponeurotica | 10 Head of mandible | 22 Zygomaticus major muscle |
| 2 Temporal fascia | 11 Masseteric artery and nerve | 23 Maxillary artery |
| 3 Temporal muscle | 12 Mandibular notch | 24 Coronoid process |
| 4 Parietal branch of superficial temporal artery | 13 Masseter muscle (divided) | 25 Parotid duct (divided) |
| 5 Auriculotemporal nerve | 14 External carotid artery | 26 Buccal nerve |
| 6 Frontal branch of superficial temporal artery | 15 Great auricular nerve | 27 Facial artery and vein |
| 7 Superficial temporal vein | 16 Facial nerve (reflected) | 28 Mental nerve |
| 8 Zygomatic arch | 17 Frontal belly of occipitofrontalis muscle | 29 Mandibular branch of facial nerve |
| 9 Articular disc of temporomandibular joint | 18 Medial branch of supra-orbital nerve | 30 Cervical branch of facial nerve |
| | 19 Angular artery | 31 Transverse cervical nerve (communicating branch with facial nerve and sternocleidomastoid muscle) |
| | 20 Orbicularis oculi muscle | |
| | 21 Infra-orbital nerve | |



Deep dissection of facial and retromandibular regions. The coronoid process together with the insertions of temporal muscle have been removed to display the maxillary artery. The upper part of the mandibular canal has been opened.

- | | | |
|---|---|---|
| 1 Parietal branch of superficial temporal artery | 9 Internal jugular vein | 21 Posterior superior alveolar arteries |
| 2 Frontal branch of superficial temporal artery | 10 Mylohyoid nerve | 22 Masseteric artery and nerve |
| 3 Auriculotemporal nerve | 11 Posterior belly of digastric muscle | 23 Buccal nerve and artery |
| 4 Maxillary artery | 12 Great auricular nerve and sternocleidomastoid muscle | 24 Lateral pterygoid |
| 5 Superficial temporal artery | 13 External jugular vein | 25 Transverse facial artery and parotid duct (divided) |
| 6 Communicating branches between facial and auriculotemporal nerves | 14 Retromandibular vein | 26 Medial pterygoid muscle |
| 7 Facial nerve | 15 Submandibular gland | 27 Facial artery |
| 8 Posterior auricular artery and anterior auricular branch of superficial temporal artery | 16 Temporal fascia | 28 Lingual nerve |
| | 17 Temporal tendon | 29 Inferior alveolar artery and nerve (mandibular canal opened) |
| | 18 Deep temporal arteries | |
| | 19 Posterior superior alveolar nerve | |
| | 20 Sphenopalatine artery | |

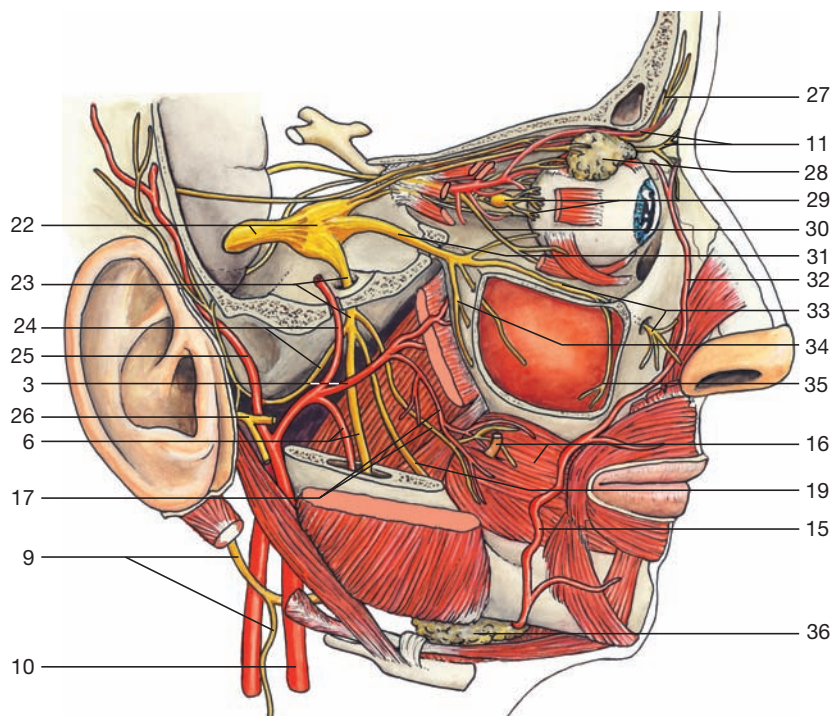


Dissection of peripharyngeal and retromandibular regions. The mandible has been partly removed (oblique-lateral aspect).

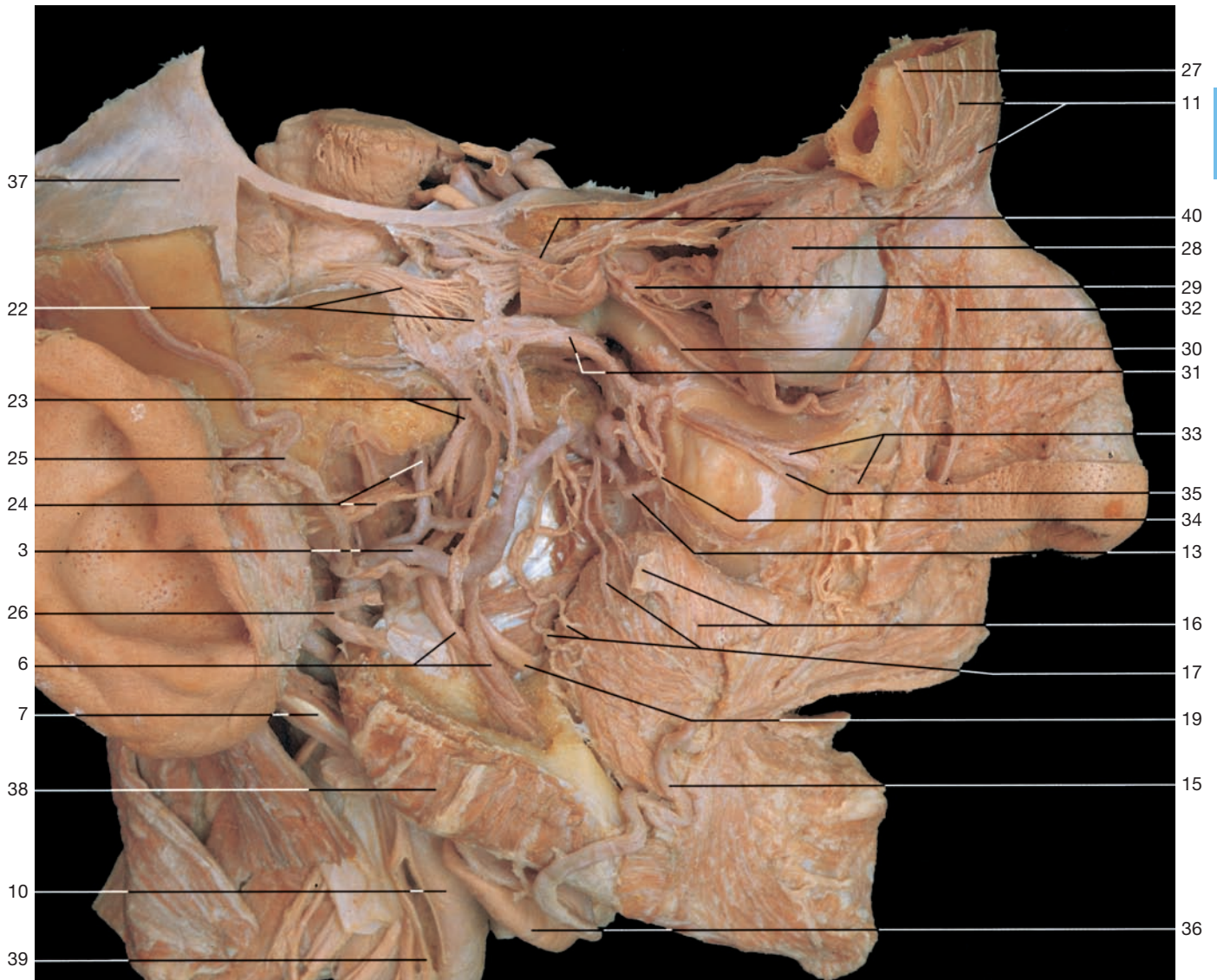
- | | | |
|--|--|--|
| 1 Supra-orbital nerve (medial branch) | 10 Submandibular ganglion | 20 Posterior belly of digastric muscle |
| 2 Temporal muscle | 11 Facial artery | 21 Accessory nerve (Var.) |
| 3 Superficial temporal artery and auriculotemporal nerve | 12 Mylohyoid muscle and nerve | 22 Sternocleidomastoid muscle |
| 4 Orbicularis oculi muscle | 13 Anterior belly of digastric muscle | 23 Hypoglossus nerve (n. XII) |
| 5 Anterior deep temporal artery | 14 Omohyoid muscle | 24 Supraclavicular nerves (lateral and intermedial branches) |
| 6 Maxillary artery | 15 Occipital artery | 25 Internal jugular vein and ansa cervicalis |
| 7 Buccal nerve | 16 Greater occipital nerve (C ₂) | 26 Anterior supraclavicular nerve |
| 8 Lingual nerve | 17 Facial nerve (cut) (n. VII) | |
| 9 Inferior alveolar nerve and artery | 18 Great auricular nerve | |
| | 19 Lesser occipital nerve | |



Deep dissection of facial and retromandibular regions. The mandible and pterygoid muscles have been removed, the temporal muscle was fenestrated.



Deep region of the face with arteries and nerves, particularly dissection of maxillary artery and trigeminal nerve.

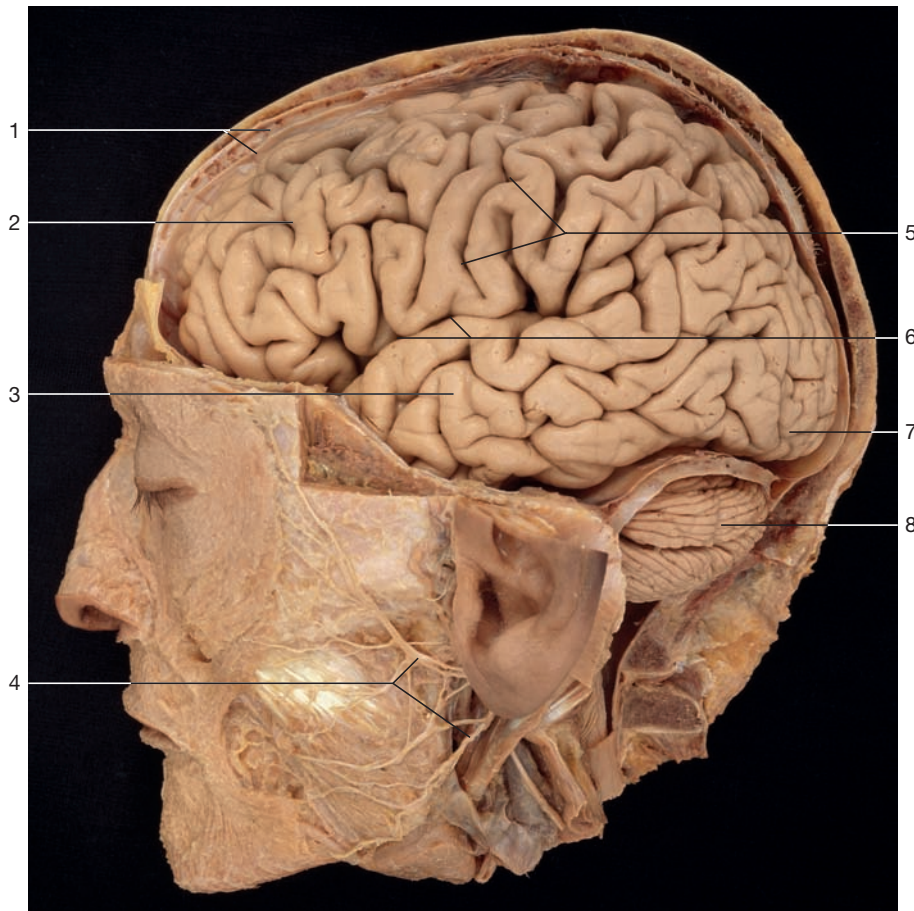


Dissection of para- and retropharyngeal regions. The mandible and the lateral wall of the orbit have been removed. The main branches of the trigeminal nerve and its ganglion are displayed.

- | | | |
|---|---|--|
| 1 Superficial temporal artery and vein and auriculotemporal nerve | 12 Angular artery | 25 Superficial temporal artery |
| 2 Tendon of temporal muscle, deep temporal nerves and artery | 13 Posterior superior alveolar artery | 26 Facial nerve |
| 3 Maxillary artery | 14 Infra-orbital nerve | 27 Lateral branch of supra-orbital nerve |
| 4 Middle meningeal artery | 15 Facial artery | 28 Lacrimal gland |
| 5 Occipital artery | 16 Parotid duct (divided) and buccinator muscle | 29 Ciliary ganglion and short ciliary nerves |
| 6 Inferior alveolar artery and nerve | 17 Buccal artery and nerve | 30 Inferior branch of oculomotor nerve |
| 7 Posterior belly of digastric muscle | 18 Mylohyoid nerve | 31 Maxillary nerve (n. V ₂) |
| 8 Great auricular nerve and sternocleidomastoid muscle | 19 Lingual nerve and submandibular ganglion | 32 Angular artery |
| 9 Hypoglossal nerve and superior root of ansa cervicalis | 20 Mental nerve and foramen | 33 Infra-orbital nerve |
| 10 External carotid artery | 21 Inferior alveolar nerve | 34 Posterior superior alveolar nerve |
| 11 Supratrochlear nerve and medial branch of supra-orbital artery | 22 Trigeminal nerve and ganglion | 35 Anterior superior alveolar nerve |
| | 23 Mandibular nerve (n. V ₃) | 36 Submandibular gland |
| | 24 Auriculotemporal nerve and middle meningeal artery | 37 Cerebellar tentorium |
| | | 38 Masseter muscle |
| | | 39 Superior root of ansa cervicalis |
| | | 40 Ophthalmic nerve (n. V ₁) |

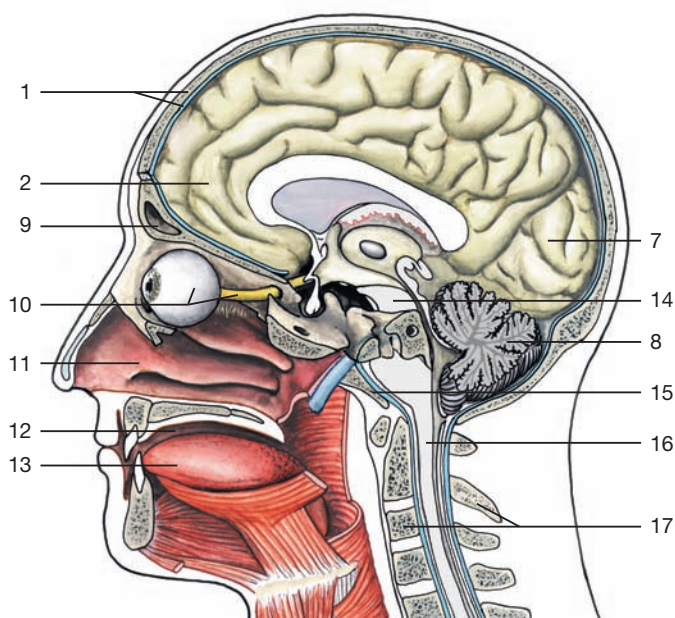


2.4 Brain and Sensory Organs

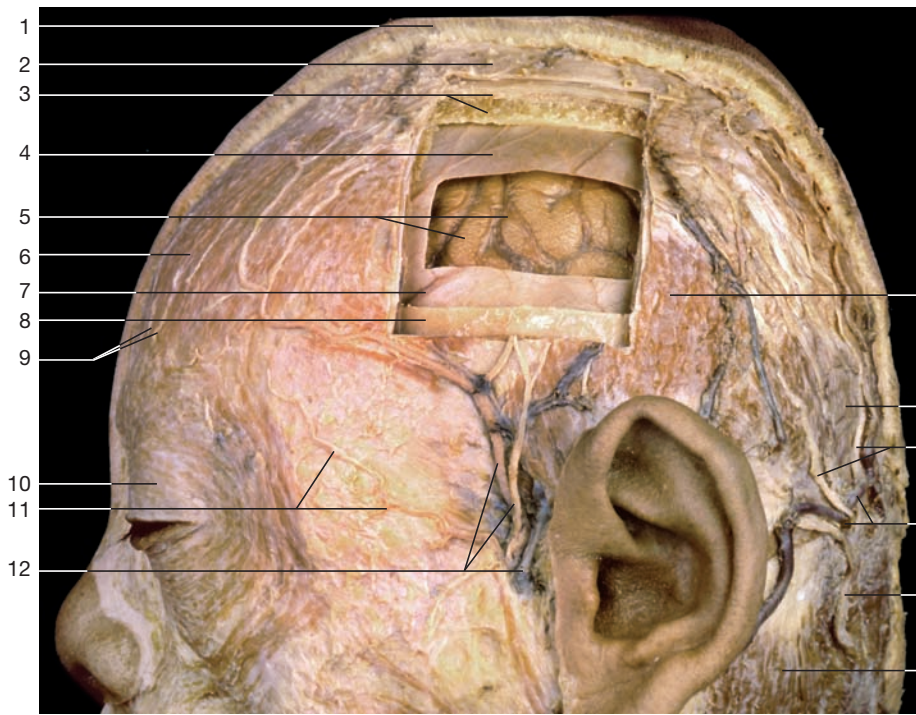


- 1 Vertex of the skull and dura mater
- 2 Frontal lobe
- 3 Temporal lobe
- 4 Facial nerve (n. VII)
- 5 Central sulcus
- 6 Lateral sulcus
- 7 Occipital lobe
- 8 Cerebellum
- 9 Frontal sinus
- 10 Eye and optic nerve (n. II)
- 11 Nasal cavity
- 12 Oral cavity
- 13 Tongue
- 14 Brain stem
- 15 Base of skull
- 16 Spinal cord
- 17 Vertebral column

Dissection of the head to show the brain with pia mater and arachnoid in situ (lateral aspect).

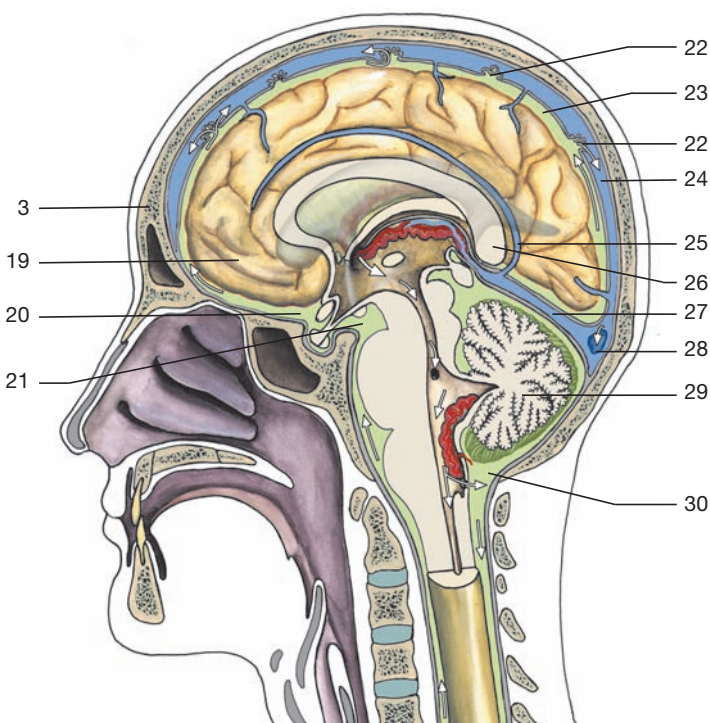


Sagittal section through the head with brain and sensory organs. The eye with the optic nerve is located within the orbit; the labyrinth organ, within the petrous bone.



Lateral aspect of the head. Scalp, vertex of the skull, and meninges are demonstrated by a series of window-like openings.

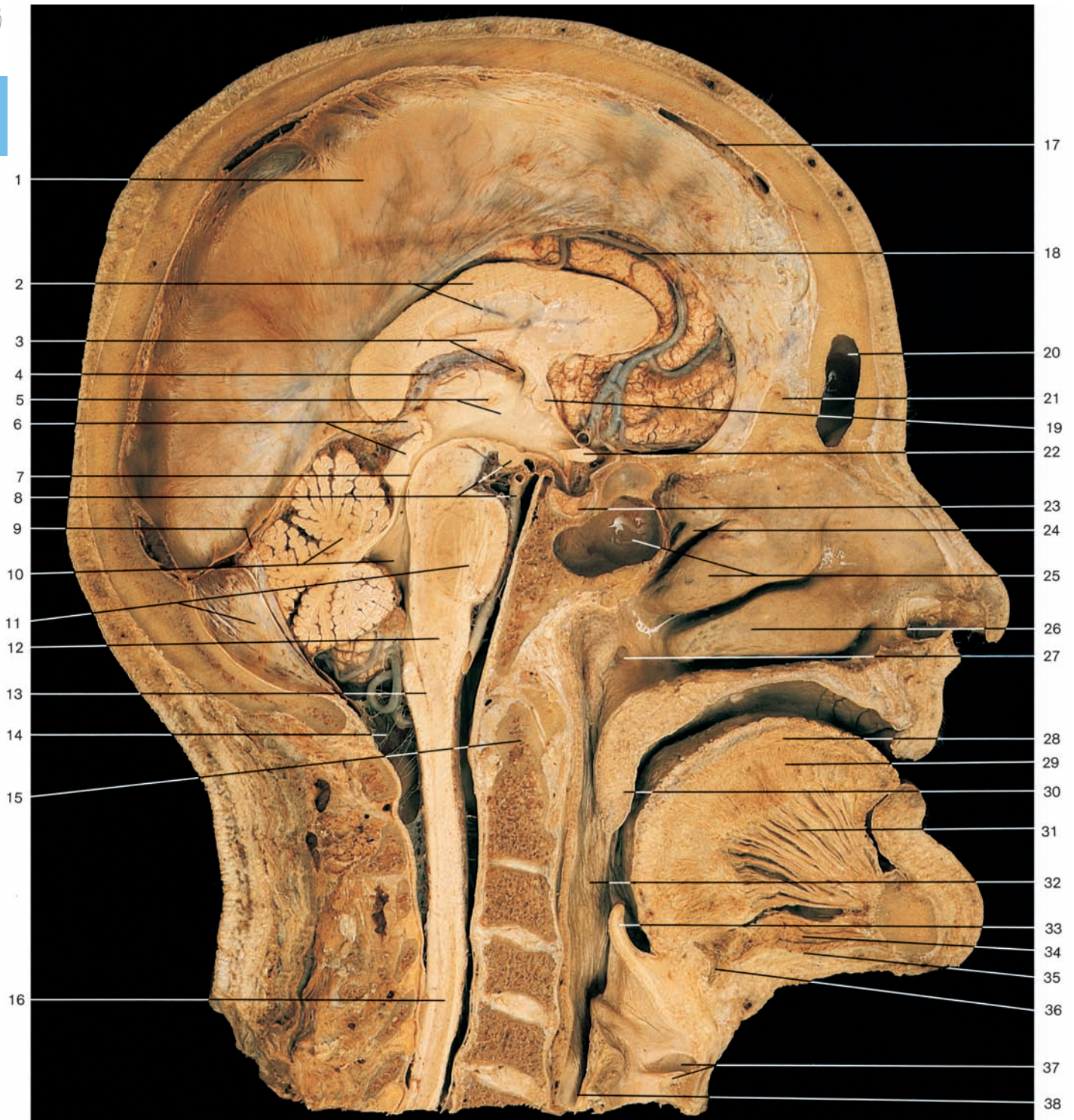
- 1 Skin
- 2 Galea aponeurotica
- 3 Skull diploe
- 4 Dura mater
- 5 Arachnoid and pia mater with cerebral vessels
- 6 Frontal belly of occipitofrontalis muscle
- 7 Branch of middle meningeal artery
- 8 Pericranium (periosteum)
- 9 Lateral and medial branches of supra-orbital nerve
- 10 Orbicularis oculi muscle
- 11 Zygomatico-orbital artery
- 12 Auriculotemporal nerve and superficial temporal artery and vein
- 13 Superior auricular muscle
- 14 Occipital belly of occipitofrontalis muscle
- 15 Occipital nerve
- 16 Occipital artery and vein
- 17 Greater occipital nerve
- 18 Sternocleidomastoid muscle
- 19 Frontal lobe
- 20 Chiasmatic cistern
- 21 Interpeduncular cistern
- 22 Arachnoid granulations
- 23 Subarachnoid space
- 24 Superior sagittal sinus
- 25 Inferior sagittal sinus
- 26 Corpus callosum
- 27 Straight sinus
- 28 Confluence of sinuses
- 29 Cerebellum
- 30 Cerebellomedullar cistern
- 31 Cerebral cortex



Subarachnoid cisterns of the brain (midsagittal section). Green = cisterns; blue = dural sinus and ventricles; red = choroid plexus of third and fourth ventricles; arrows: flow of cerebrospinal fluid.

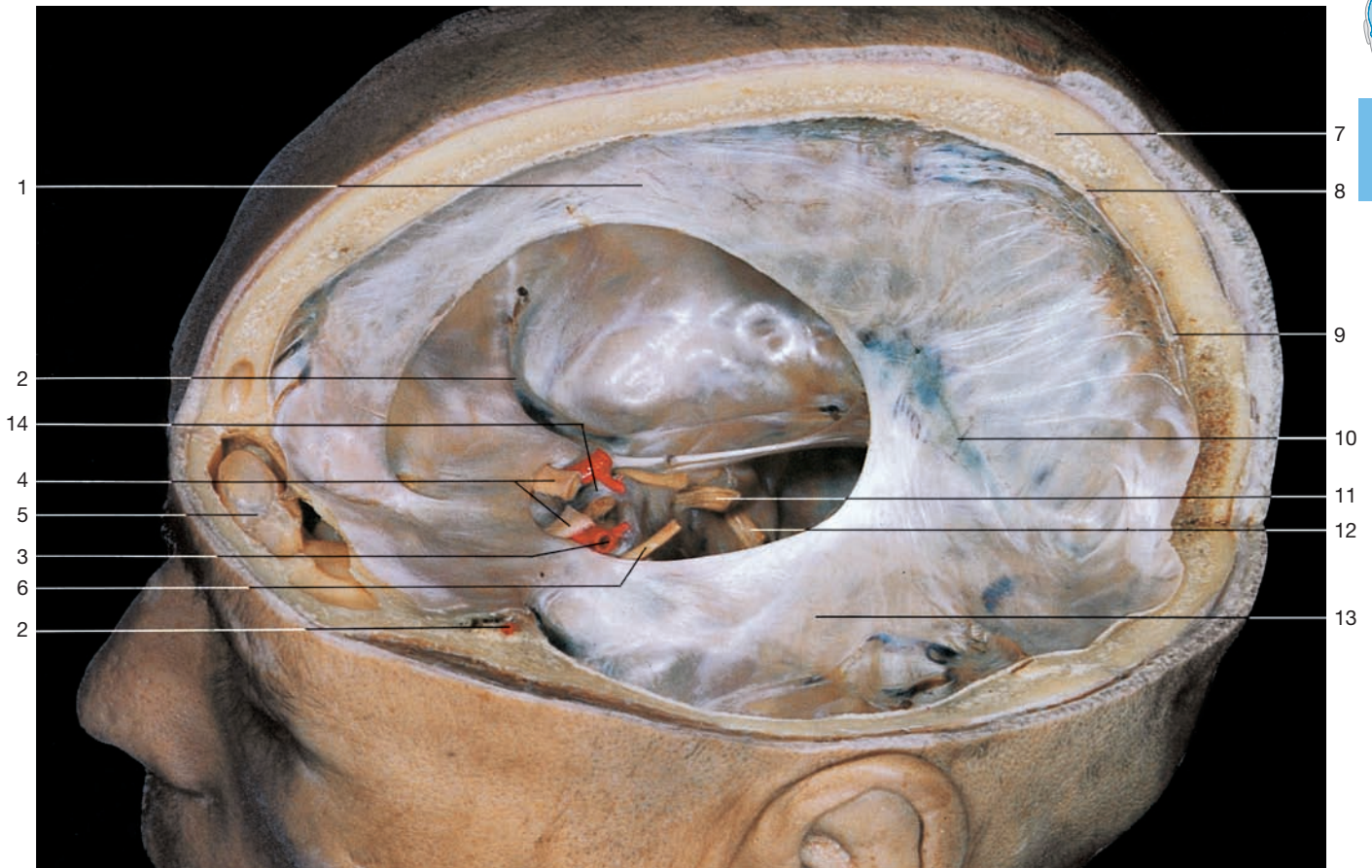


Cross section of the scalp and the meninges. The subarachnoid space (23) is shown.



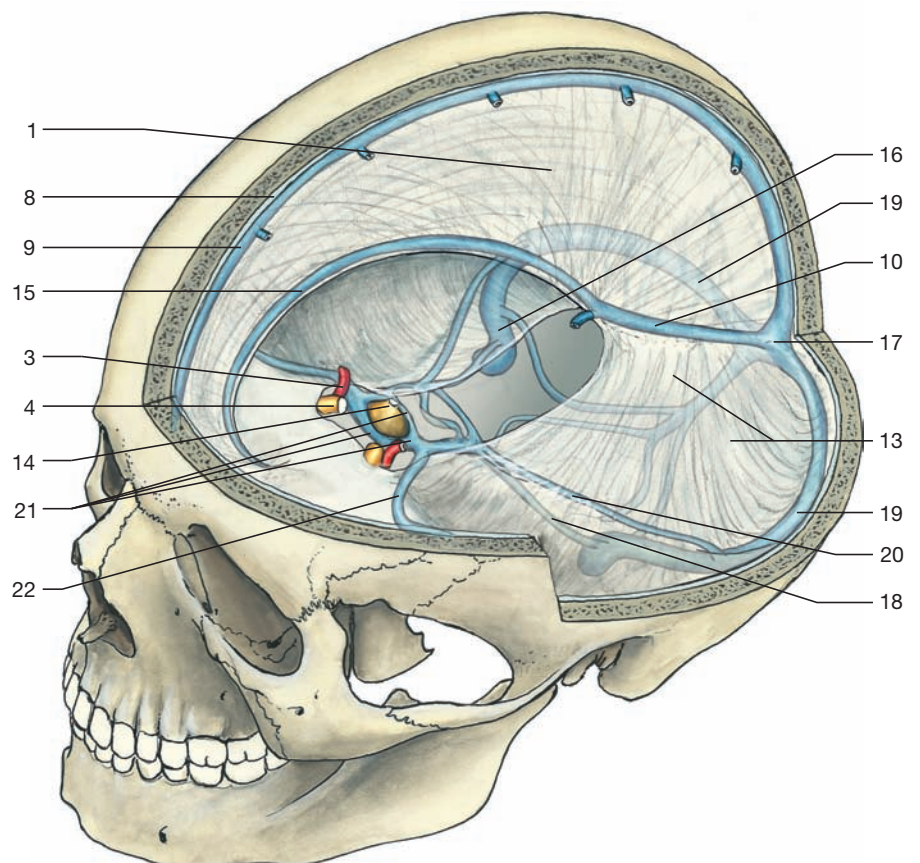
Median sagittal section through the head and neck.

- | | | |
|--|---|---|
| 1 Falx cerebri | 14 Cerebellomedullary cistern | 27 Pharyngeal opening of auditory tube |
| 2 Corpus callosum and septum pellucidum | 15 Dens of the axis (odontoid process) | 28 Superior longitudinal muscle of tongue |
| 3 Interventricular foramen and fornix | 16 Spinal cord | 29 Vertical muscle of the tongue |
| 4 Choroid plexus of third ventricle and internal cerebral vein | 17 Superior sagittal sinus | 30 Uvula |
| 5 Third ventricle and interthalamic adhesion | 18 Anterior cerebral artery | 31 Genioglossus muscle |
| 6 Pineal body and colliculi of the midbrain | 19 Anterior commissure | 32 Pharynx |
| 7 Cerebral aqueduct | 20 Frontal sinus | 33 Epiglottis |
| 8 Mamillary body and basilar artery | 21 Crista galli | 34 Geniohyoid muscle |
| 9 Straight sinus | 22 Optic chiasma | 35 Mylohyoid muscle |
| 10 Fourth ventricle and cerebellum | 23 Pituitary gland (hypophysis) | 36 Hyoid bone |
| 11 Pons and falx cerebelli | 24 Superior nasal concha | 37 Vocal fold and sinus of larynx |
| 12 Medulla oblongata | 25 Middle nasal concha and sphenoid sinus | 38 Esophagus |
| 13 Central canal | 26 Inferior nasal concha | |

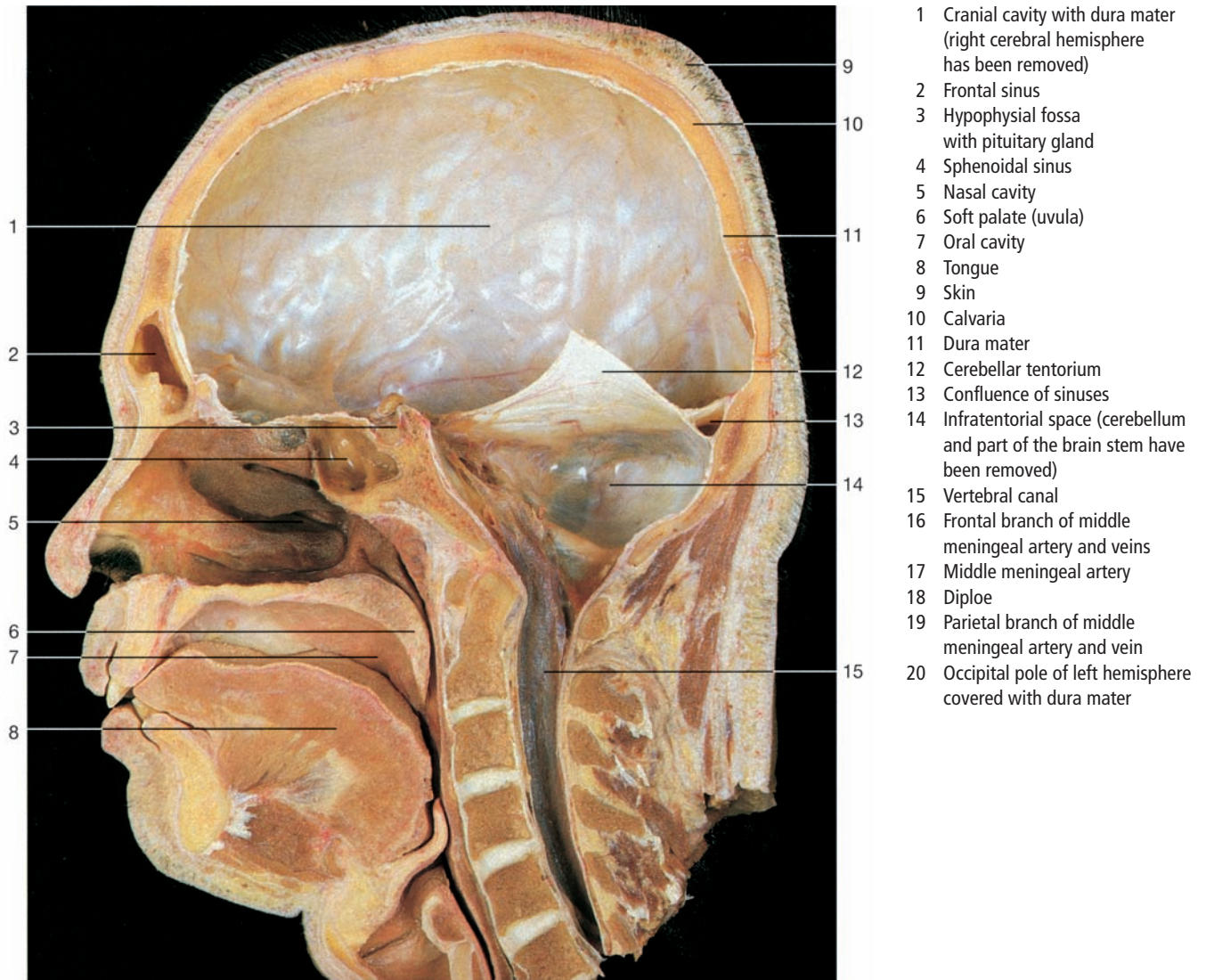


Dura mater and venous sinuses of the dura mater. The brain has been removed (oblique-lateral aspect).

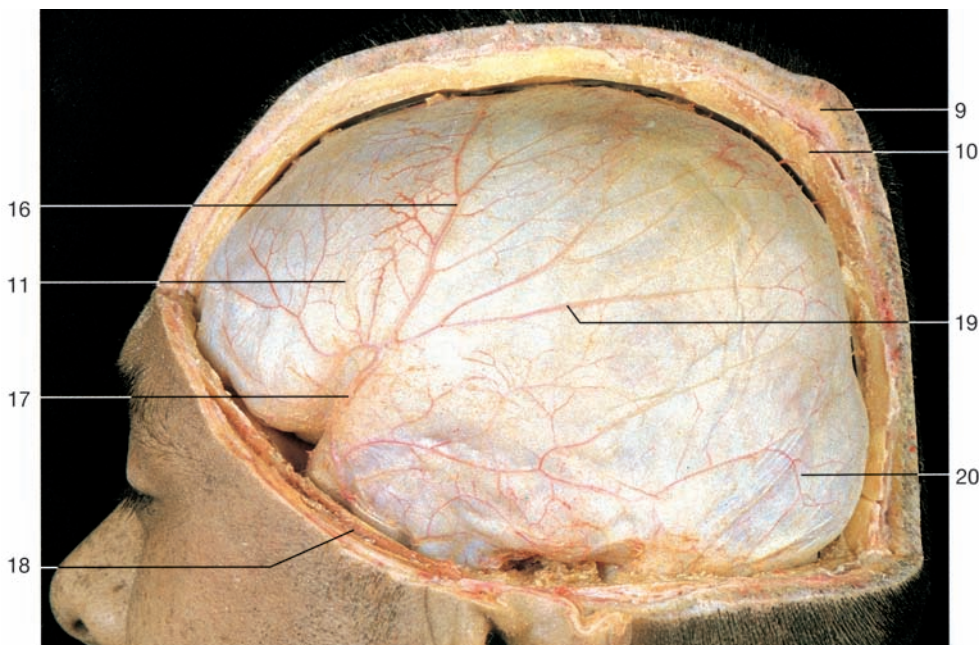
- 1 Falx cerebri
- 2 Position of middle meningeal artery and vein
- 3 Internal carotid artery
- 4 Optic nerve (n. II)
- 5 Frontal sinus
- 6 Oculomotor nerve (n. III)
- 7 Diploe
- 8 Dura mater
- 9 Superior sagittal sinus
- 10 Straight sinus
- 11 Trigeminal nerve (n. V)
- 12 Facial and vestibulocochlear nerve (n. VII and n. VIII)
- 13 Cerebellar tentorium
- 14 Pituitary gland (hypophysis)
- 15 Inferior sagittal sinus
- 16 Sigmoid sinus
- 17 Confluence of sinuses
- 18 Inferior petrosal sinus
- 19 Transverse sinus
- 20 Superior petrosal sinus
- 21 Cavernous and intercavernous sinuses
- 22 Sphenoparietal sinus



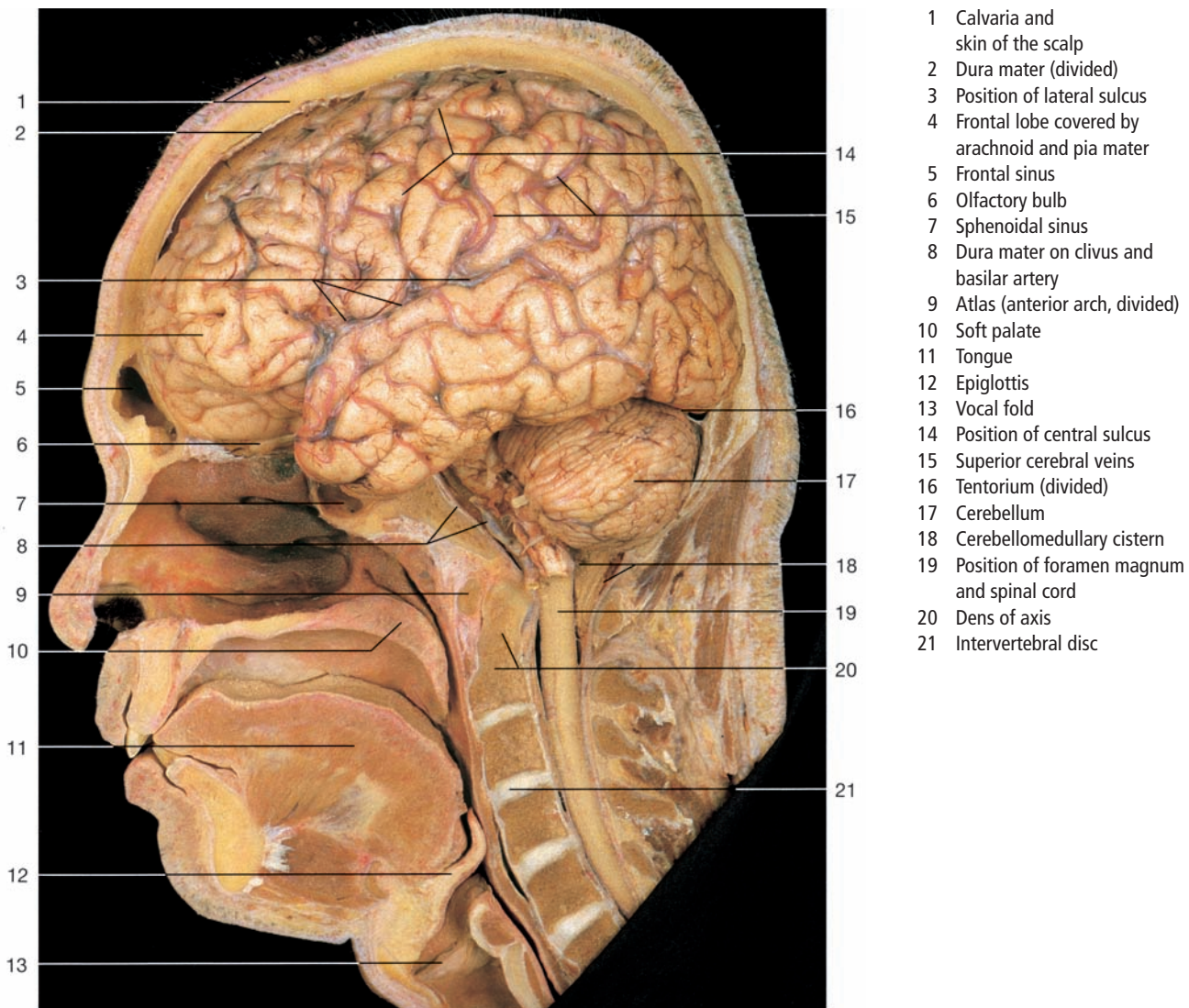
Dura mater and venous sinuses of the dura mater (left lateral aspect).



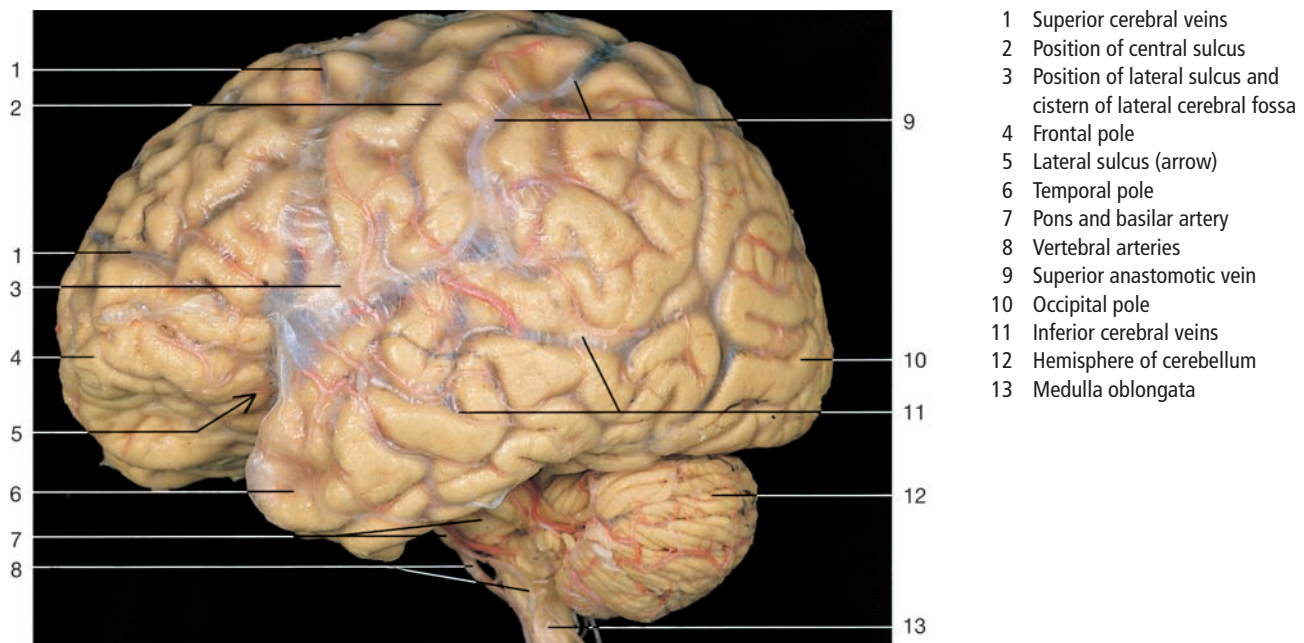
Median section through the head. Demonstration of dura mater covering the cranial cavity. Brain and spinal cord are removed (right half of the head, as seen from medial).



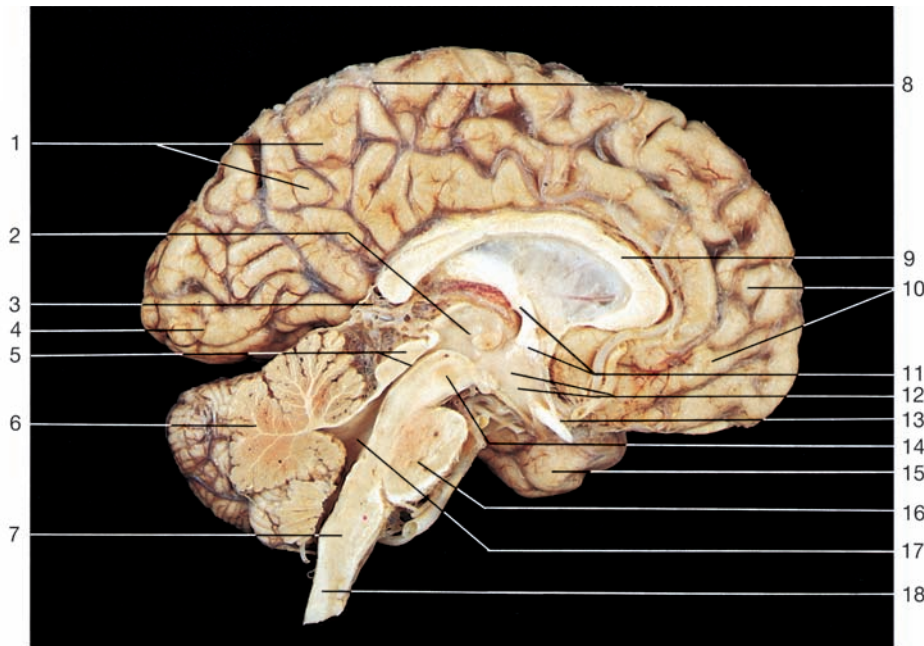
Dissection of dura mater and meningeal vessels. Left half of calvaria removed.



Dissection of the brain with pia mater and arachnoid in situ. The head is cut in half except for the brain, which is shown in its entirety.



Brain with pia mater and arachnoid. Frontal pole to the left (lateral aspect).

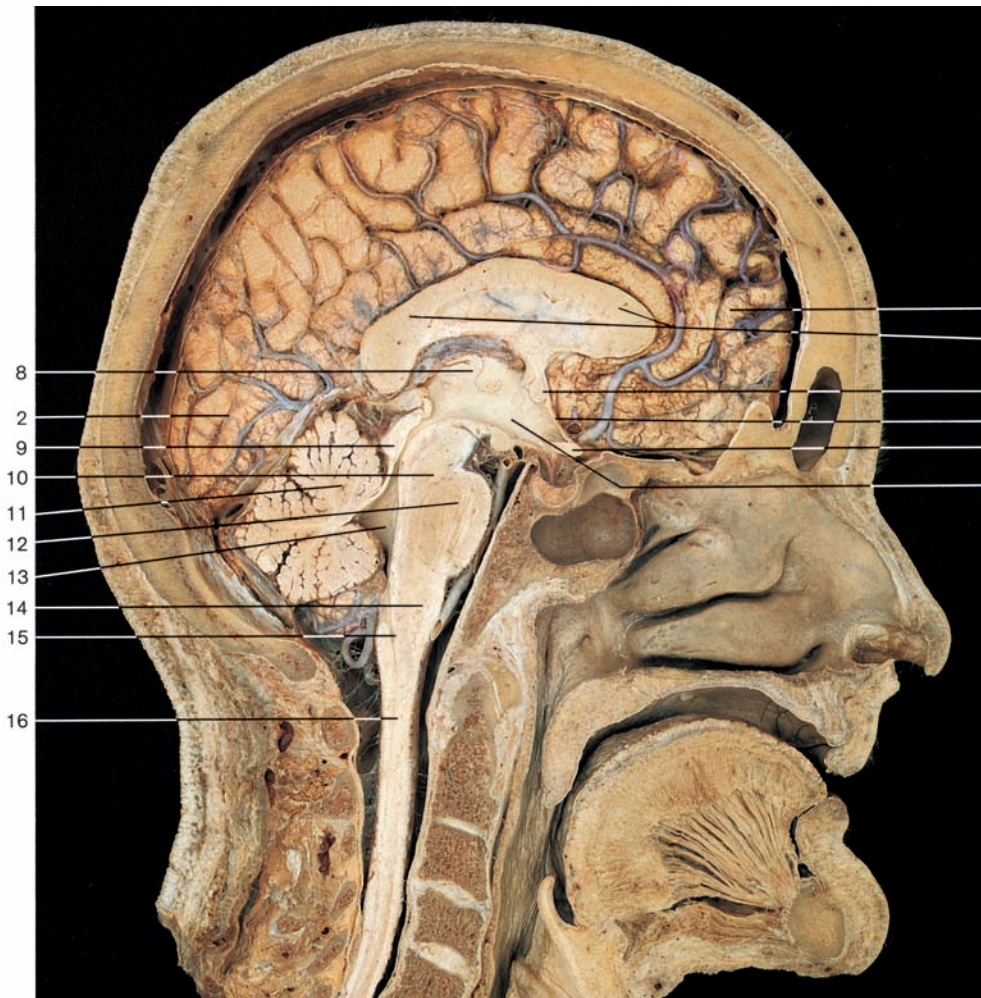


Median section through brain and brain stem. Frontal pole to the right.

- 1 Parietal lobe
- 2 Thalamus, third ventricle, and intermediate mass
- 3 Great cerebral vein
- 4 Occipital lobe
- 5 Colliculi of the midbrain and cerebral aqueduct
- 6 Cerebellum
- 7 Medulla oblongata
- 8 Central sulcus
- 9 Corpus callosum
- 10 Frontal lobe
- 11 Fornix and anterior commissure
- 12 Hypothalamus
- 13 Optic chiasma
- 14 Midbrain
- 15 Temporal lobe
- 16 Pons
- 17 Fourth ventricle
- 18 Spinal cord
- 19 Cerebellomedullar cistern
- 20 Olfactory bulb
- 21 Hypophysial fossa (sella turcica) with pituitary gland
- 22 Sphenoid sinus
- 23 Basilar artery
- 24 Ligaments to the dens of axis
- 25 Tongue

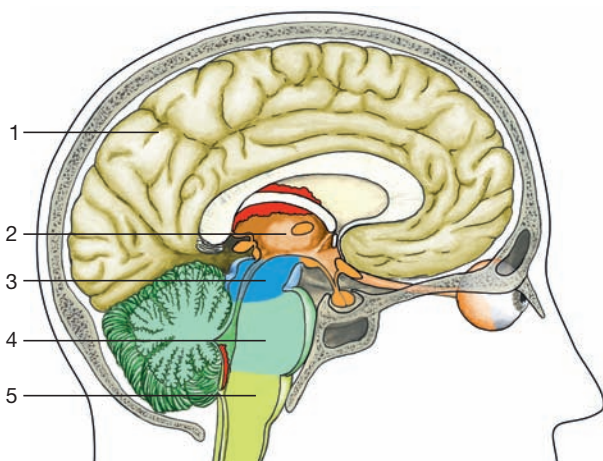


Median section through the head (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



- 1 Frontal lobe of cerebrum
- 2 Occipital lobe of cerebrum
- 3 Corpus callosum
- 4 Anterior commissure
- 5 Lamina terminalis
- 6 Optic chiasma
- 7 Hypothalamus
- 8 Thalamus and third ventricle
- 9 Colliculi of the midbrain
- 10 Midbrain (inferior portion)
- 11 Cerebellum
- 12 Pons
- 13 Fourth ventricle
- 14 Medulla oblongata
- 15 Central canal
- 16 Spinal cord

Median section through the head. Regions of the brain. Falx cerebri removed.



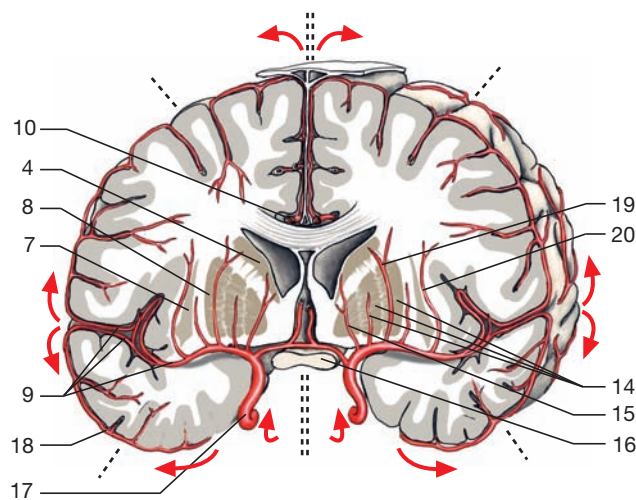
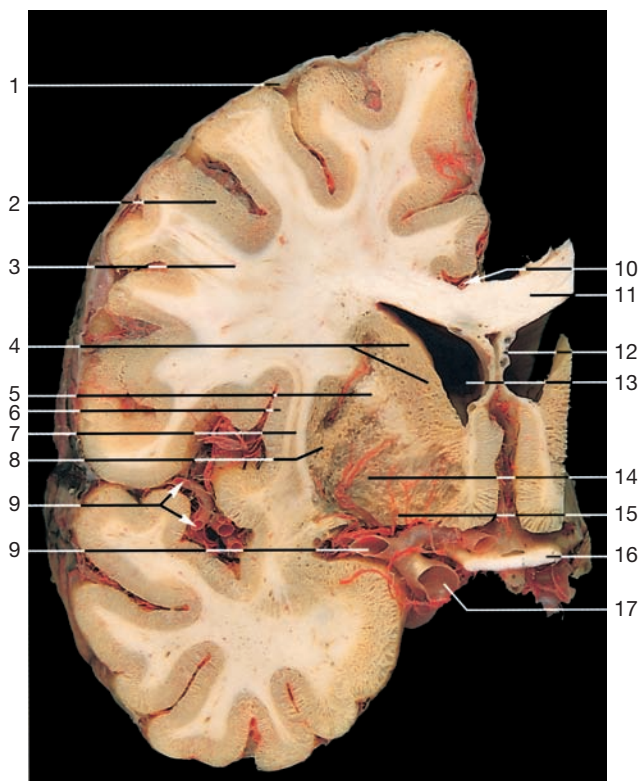
Median section through the head with colored highlighting of the brain divisions.

- 1 Telencephalon (yellow) with lateral ventricles
- 2 Diencephalon (orange) with third ventricle, optic nerve, and retina
- 3 Mesencephalon (blue) with cerebral aqueduct
- 4 Metencephalon (green) with fourth ventricle
- 5 Myelencephalon (yellow-green)



- 1 Superior cerebral veins and parietal lobe
- 2 Frontal lobe
- 3 Superficial middle cerebral vein and cistern of lateral cerebral fossa
- 4 Temporal lobe
- 5 Occipital lobe
- 6 Inferior cerebral veins and transverse occipital sulcus
- 7 Inferior anastomotic vein
- 8 Cerebellum
- 9 Medulla oblongata

Brain with pia mater and arachnoid (lateral aspect). Cerebral veins (bluish). In the lateral sulcus the cistern of the lateral fossa is recognizable. Frontal lobe to the left.

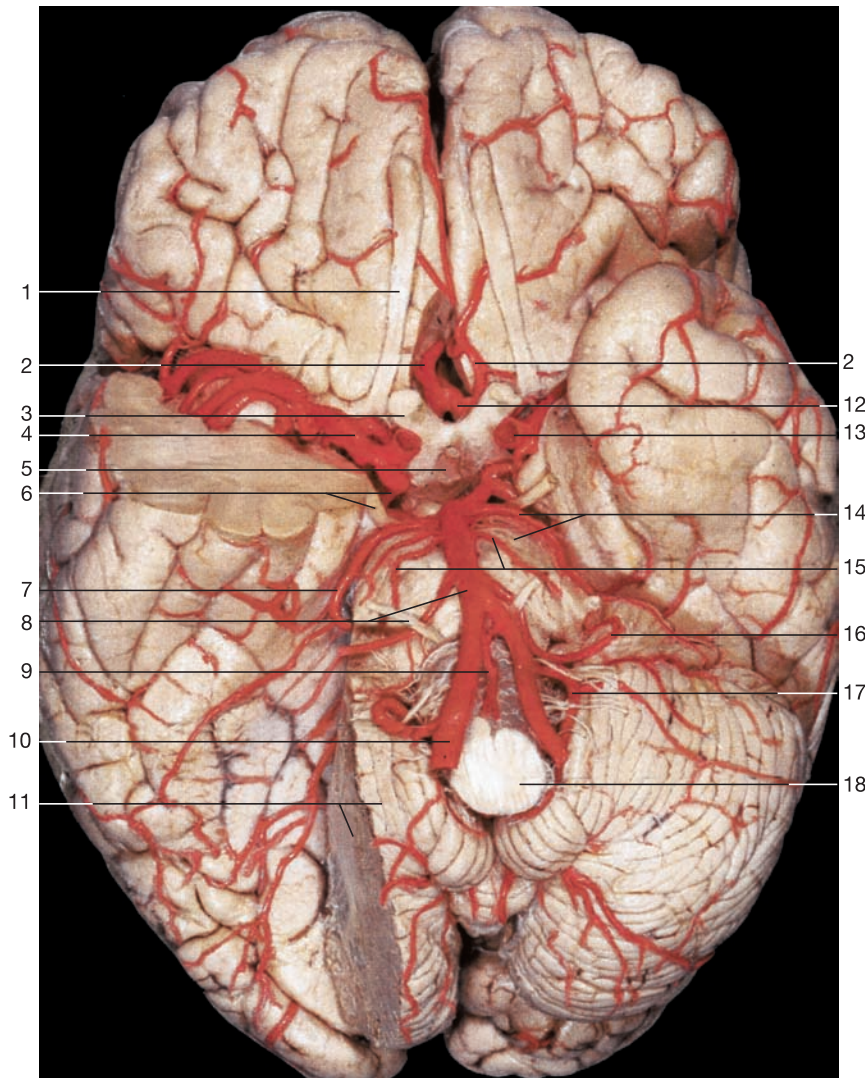


Arteries of the brain (coronal section). Areas supplied by cortical and central arteries. Dotted lines indicate boundaries of arterial supply areas. Arrows: direction of blood flow.

◁ **Coronal section through the right hemisphere,** showing arachnoid, pia mater, and the arterial blood supply (anterior aspect).

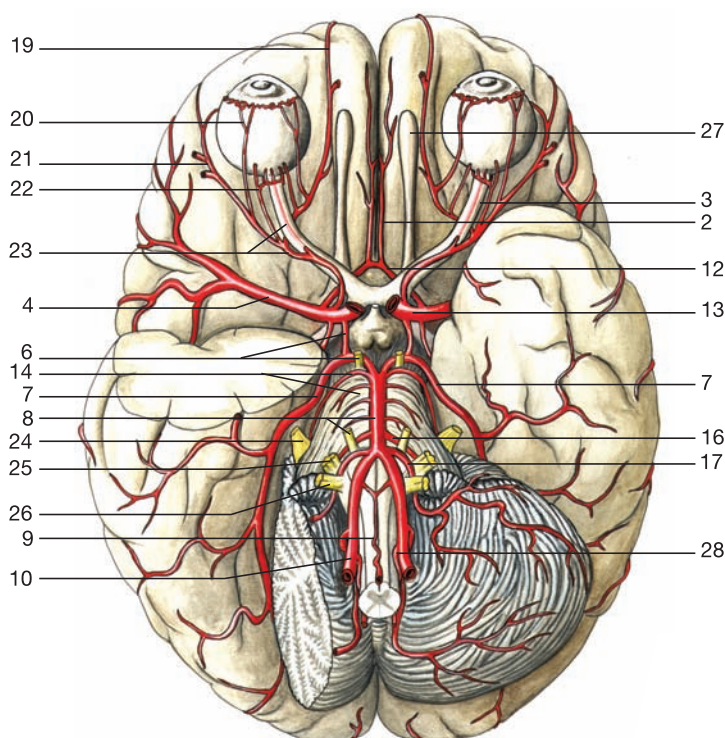
- | | |
|-------------------------------|--|
| 1 Arachnoid | 9 Middle cerebral arteries |
| 2 Cortex | 10 Anterior cerebral artery |
| 3 Frontal lobe (white matter) | 11 Corpus callosum |
| 4 Caudate nucleus | 12 Septum pellucidum |
| 5 Internal capsule | 13 Lateral ventricle |
| 6 Insular lobe | 14 Globus pallidus and pallidostriate artery |
| 7 Claustrum | 15 Thalamic artery |
| 8 Putamen | |

- | |
|------------------------------|
| 16 Optic chiasma |
| 17 Internal carotid artery |
| 18 Posterior cerebral artery |
| 19 Posterior striate branch |
| 20 Insular artery |

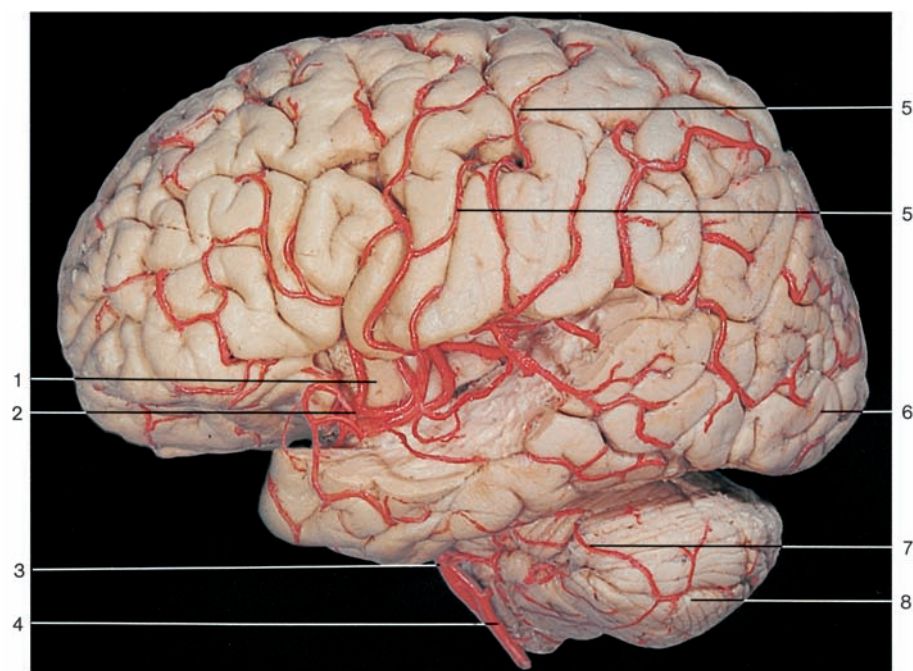


- 1 Olfactory tract
- 2 Anterior cerebral artery
- 3 Optic nerve (n. II)
- 4 Middle cerebral artery
- 5 Infundibulum
- 6 Oculomotor nerve (n. III) and posterior communicating artery
- 7 Posterior cerebral artery
- 8 Basilar artery and abducent nerve (n. VI)
- 9 Anterior spinal artery
- 10 Vertebral artery
- 11 Cerebellum
- 12 Anterior communicating artery
- 13 Internal carotid artery
- 14 Superior cerebellar artery and pons
- 15 Labyrinthine arteries
- 16 Inferior anterior cerebellar artery
- 17 Inferior posterior cerebellar artery
- 18 Medulla oblongata
- 19 Supratrochlear artery
- 20 Anterior ciliary arteries
- 21 Lacrimal artery
- 22 Posterior ciliary arteries
- 23 Ophthalmic artery with central retinal artery
- 24 Trigeminal nerve (n. V)
- 25 Facial nerve (n. VII) and vestibulocochlear nerve (n. VIII)
- 26 Glossopharyngeal nerve (n. IX), vagus nerve (n. X), and accessory nerve (n. XI)
- 27 Olfactory bulb
- 28 Posterior spinal artery

Arteries of the brain (inferior aspect, frontal pole above). Right temporal lobe and cerebellum partly removed.

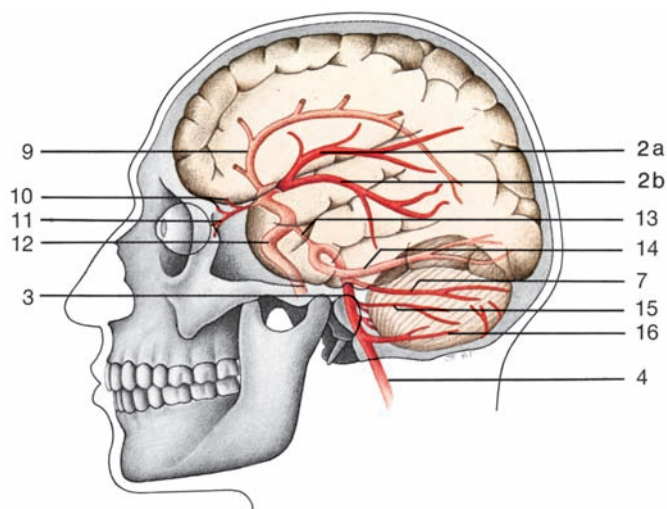


Arteries of the brain (inferior aspect). Right temporal lobe and cerebellum partly removed. Note the arterial circle of Willis around the infundibulum.

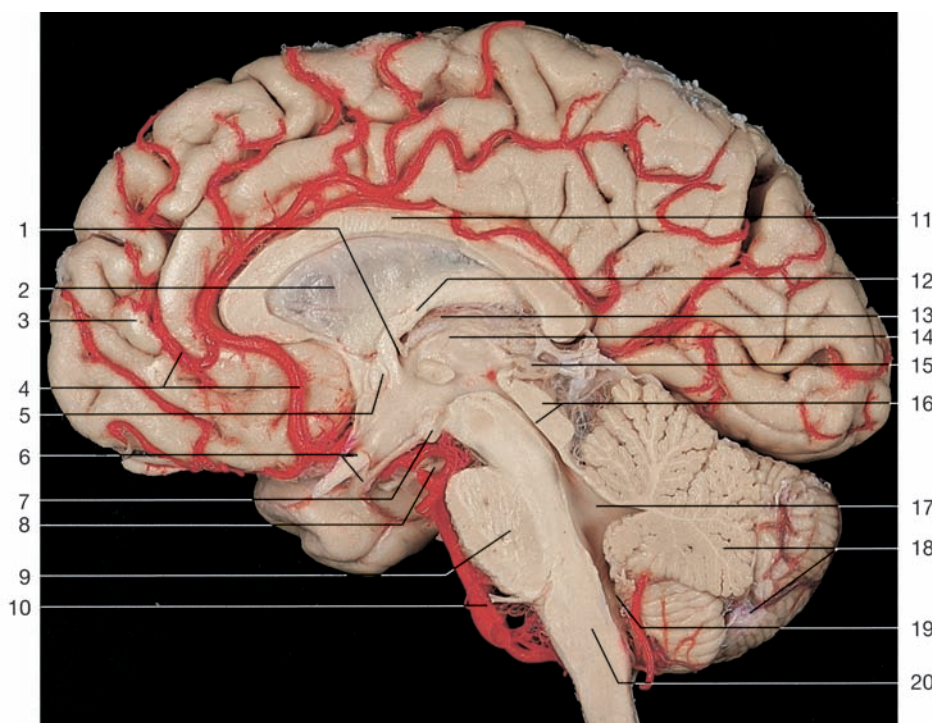


- 1 Insula
- 2 Middle cerebral artery with two branches:
a Parietal branches b Temporal branches
- 3 Basilar artery
- 4 Vertebral artery
- 5 Central sulcus
- 6 Occipital lobe
- 7 Superior cerebellar artery
- 8 Cerebellum
- 9 Anterior cerebral artery
- 10 Ethmoidal arteries
- 11 Ophthalmic artery
- 12 Internal carotid artery
- 13 Posterior communicating artery
- 14 Posterior cerebral artery
- 15 Anterior inferior cerebellar artery
- 16 Posterior inferior cerebellar artery

Arteries of the brain (lateral aspect of the left hemisphere). The upper part of the temporal lobe has been removed to display the insula and cerebral arteries (injected with red resin).

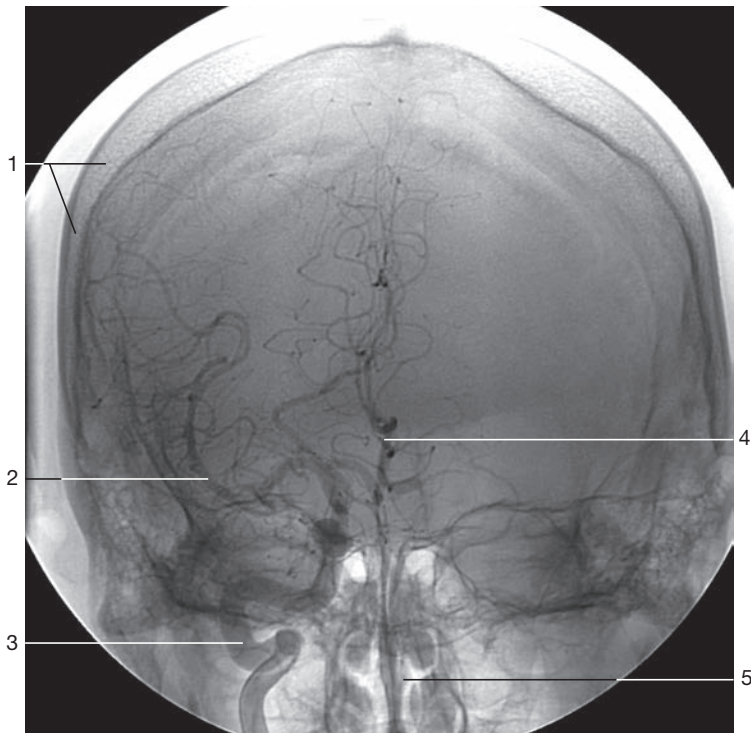


◁ **Arteries of the brain** (lateral aspect).



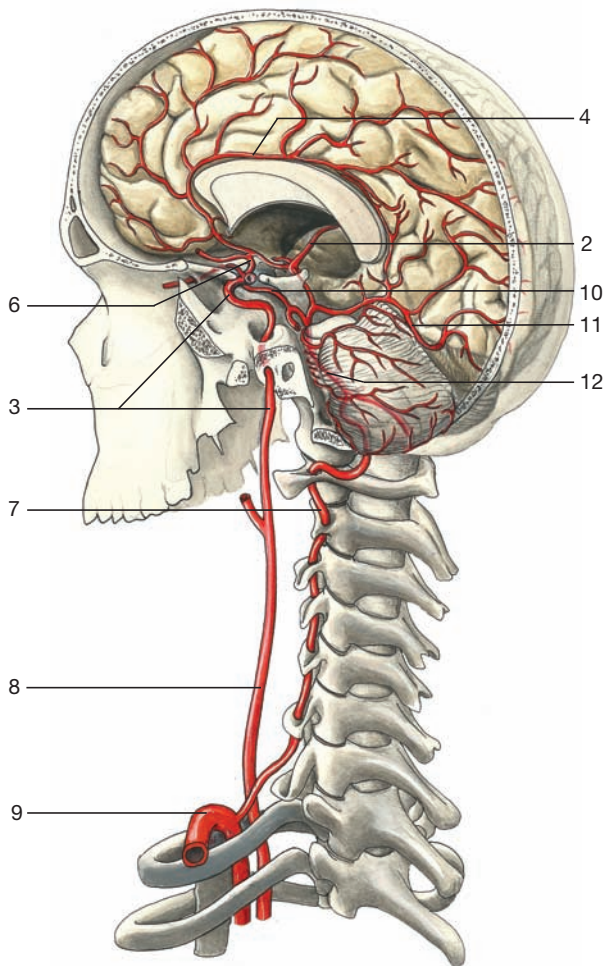
- 1 Interventricular foramen
- 2 Septum pellucidum
- 3 Frontal lobe
- 4 Anterior cerebral artery
- 5 Anterior commissure
- 6 Optic chiasma and infundibulum
- 7 Mamillary body
- 8 Oculomotor nerve (n. III)
- 9 Pons
- 10 Basilar artery
- 11 Corpus callosum
- 12 Fornix
- 13 Choroid plexus
- 14 Third ventricle
- 15 Pineal body
- 16 Tectum and cerebral aqueduct
- 17 Fourth ventricle
- 18 Cerebellum (arbor vitae, vermis)
- 19 Median aperture of Magendie
- 20 Medulla oblongata

Median section through the brain and brain stem. Cerebral arteries injected with red resin.

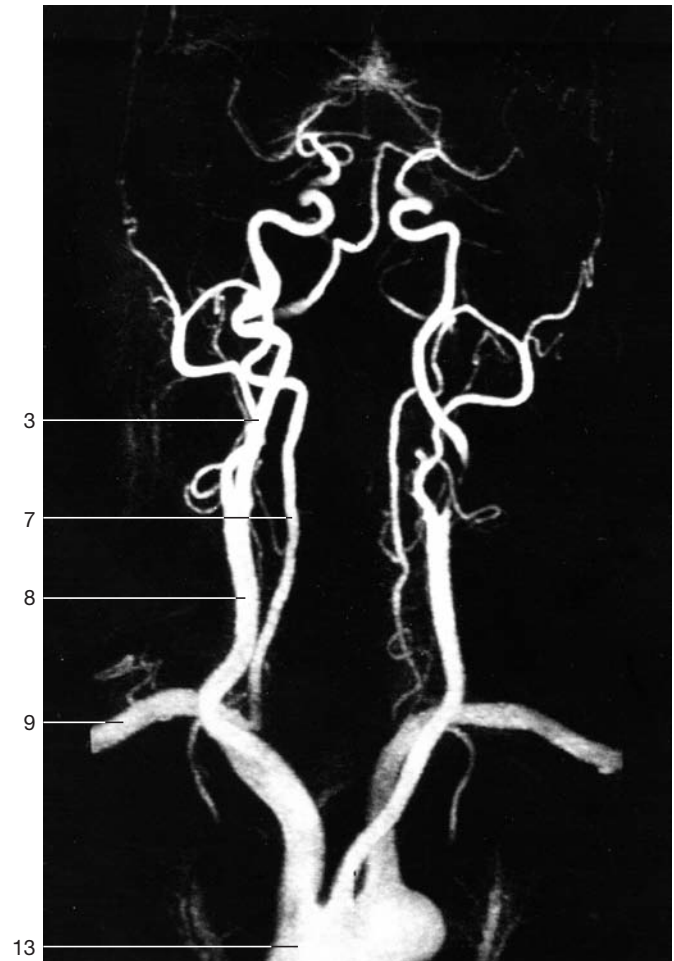


- 1 Skull diploe
- 2 Middle cerebral artery
- 3 Internal carotid artery
- 4 Anterior cerebral artery
- 5 Nasal cavity
- 6 Arterial circle of Willis
- 7 Vertebral artery
- 8 Common carotid artery
- 9 Subclavian artery
- 10 Posterior communicating artery
- 11 Posterior cerebral artery
- 12 Basilar artery
- 13 Aortic arch

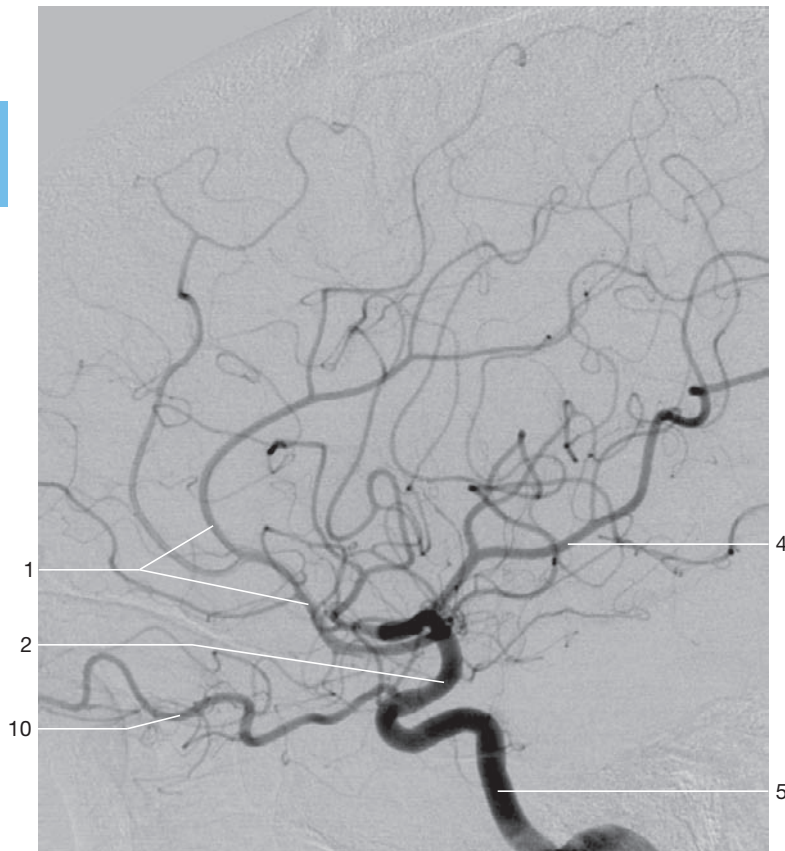
Arteriogram of the internal carotid artery (anterior aspect, right side).
(Dr. Wieners, Dept. of Radiology, Univ. Berlin, Germany.)



Arteries of the brain. Left hemisphere and brain stem have been removed. Note the arterial circle of Willis around the sella turcica.

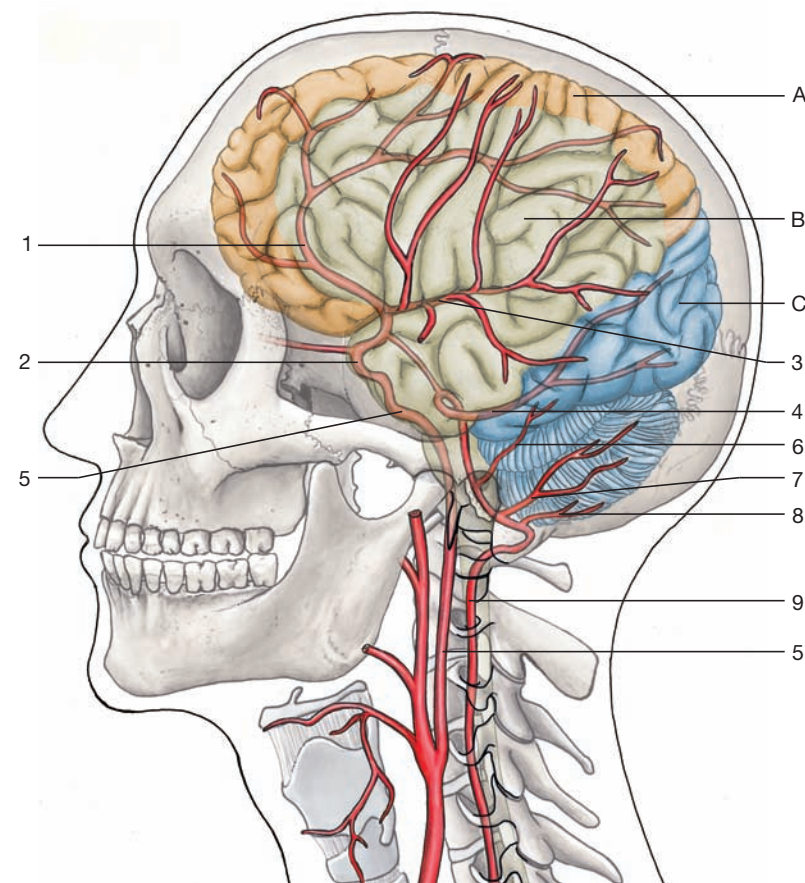


Main arteries for brain supply (anterior aspect; MRI angiograph).
(Prof. Bautz, Univ. Erlangen-Nuremberg, Germany.)



- 1 Anterior cerebral artery
- 2 Loop of the internal carotid artery
- 3 Middle cerebral artery
- 4 Posterior cerebral artery
- 5 Internal carotid artery
- 6 Superior cerebellar artery
- 7 Anterior inferior cerebellar artery
- 8 Posterior inferior cerebellar artery
- 9 Vertebral artery
- 10 Ophthalmic artery

Arteriogram of the internal carotid artery (lateral aspect).
(Prof. Huck, Dept. of Neuroradiology, Univ. Erlangen-Nuremberg, Germany.)



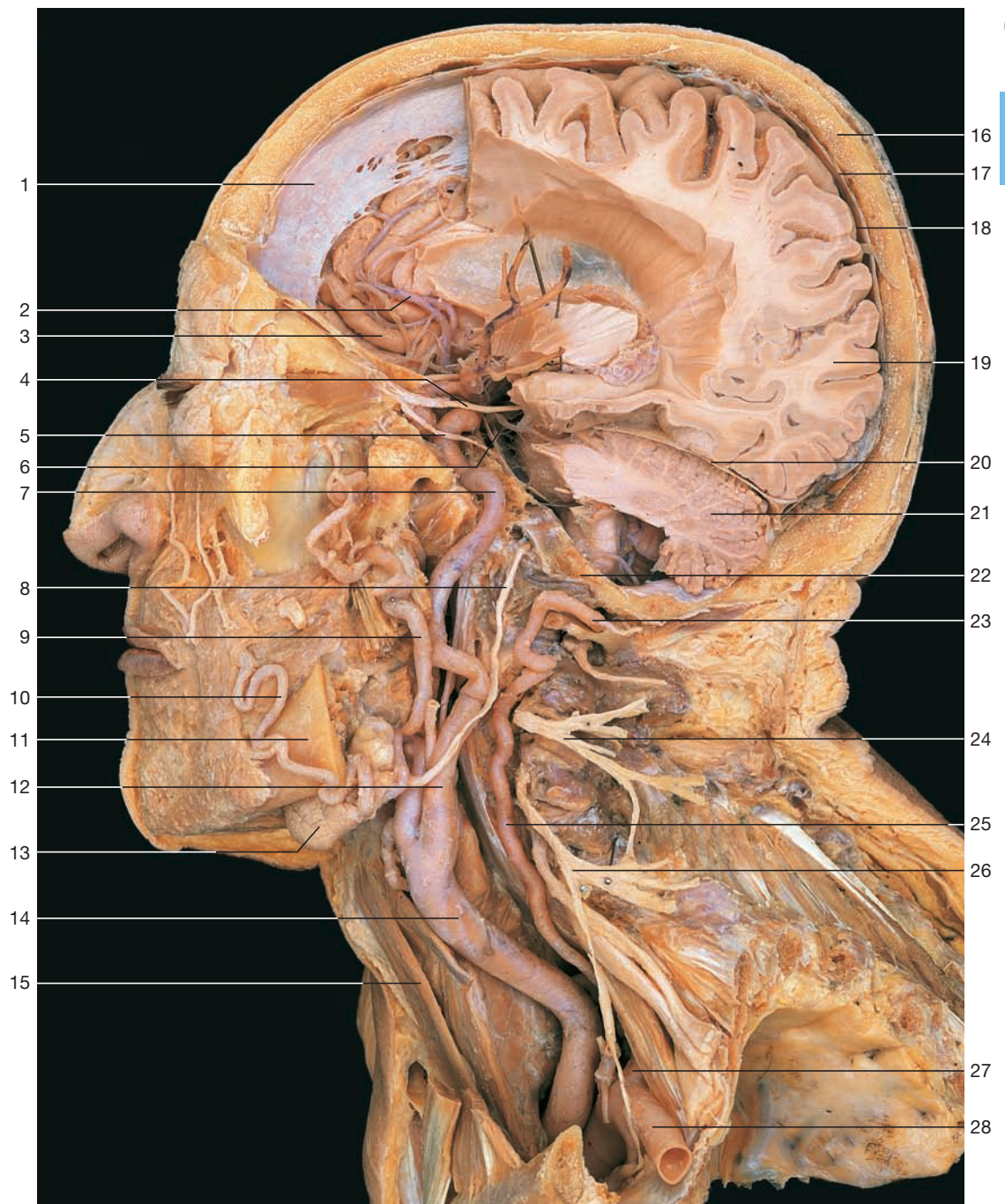
Arteries of the brain (lateral aspect). The areas supplied by the main arteries are indicated by different colors.



Arteriogram of the internal carotid artery.
Arrow: aneurysm located in the region of the sella turcica.

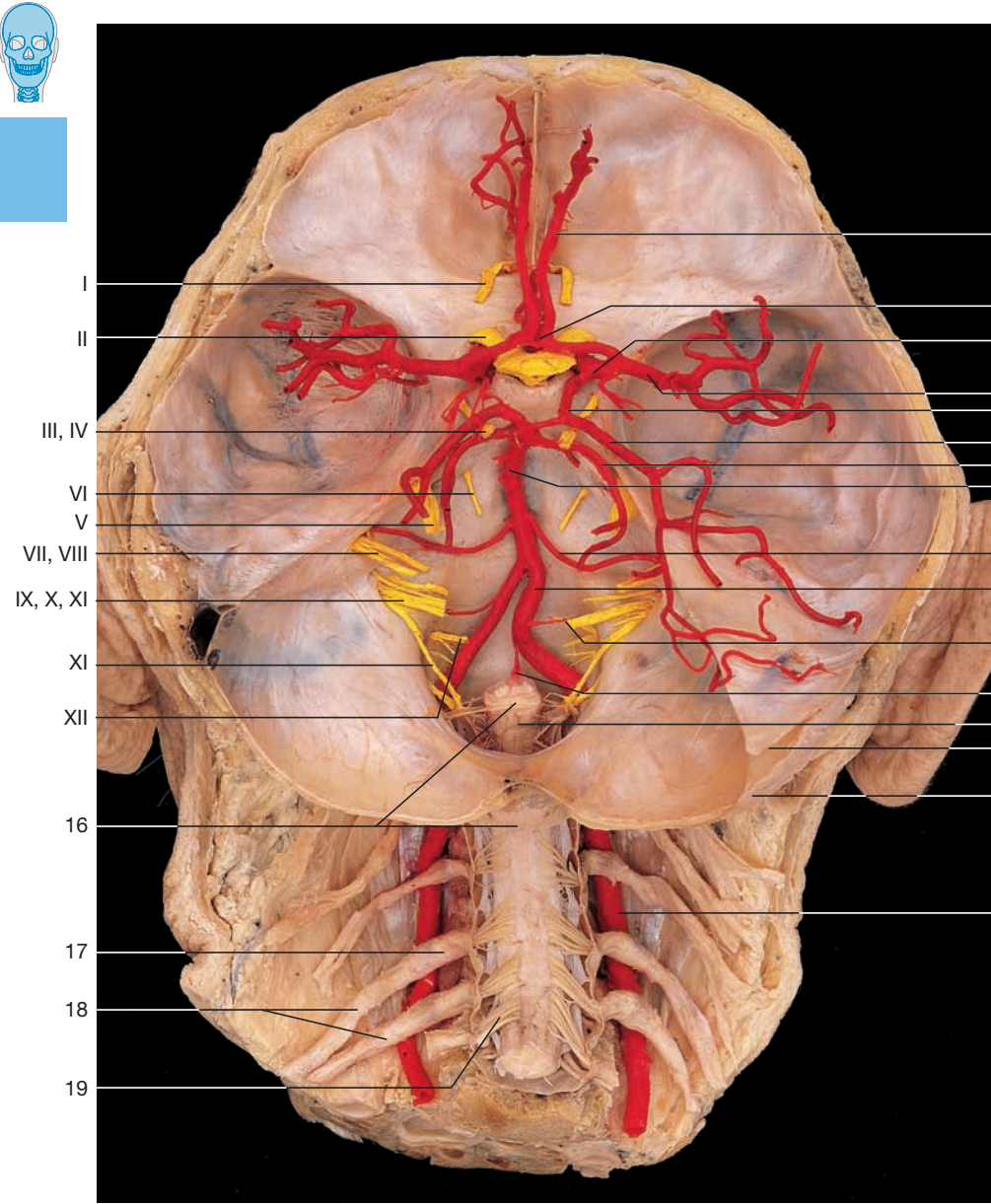
Areas of blood supply of the brain
(cerebellum = light blue).

- A = Anterior cerebral artery (upper and medial parts of the cortex) (orange)
- B = Middle cerebral artery (lateral areas of the frontal, parietal, and temporal lobes) (white)
- C = Posterior cerebral artery (occipital lobe and inferior parts of the temporal lobe) (blue)



Dissection of the arteries of the brain and head (lateral aspect). Superficial layers of facial region and left hemisphere and cerebellum partly removed.

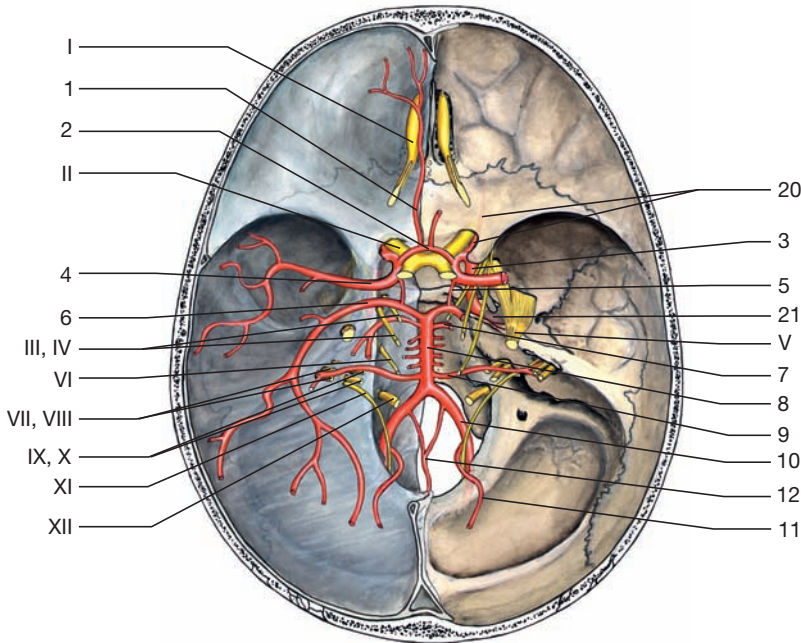
- | | |
|---|---|
| 1 Falx cerebri | 16 Calvaria |
| 2 Anterior cerebral artery | 17 Dura mater |
| 3 Frontal lobe | 18 Subarachnoid space |
| 4 Oculomotor nerve (n. III) | 19 Occipital lobe |
| 5 Abducent nerve (n. VI) | 20 Tentorium of cerebellum |
| 6 Posterior cerebral artery | 21 Cerebellum |
| 7 Internal carotid artery,
entering sinus cavernosus | 22 Base of skull |
| 8 Hypoglossus nerve (n. XII) | 23 Vertebral artery
(on the posterior arch of the atlas) |
| 9 Maxillary artery | 24 Cervical plexus |
| 10 Facial artery | 25 Vertebral artery
(removed from the cervical vertebrae) |
| 11 Mandible | 26 Brachial plexus |
| 12 External carotid artery | 27 Vertebral artery
(branching from the subclavian artery) |
| 13 Submandibular gland | 28 Subclavian artery |
| 14 Common carotid artery | |
| 15 Sternohyoid muscle | |



- 1 Anterior cerebral artery
- 2 Anterior communicating artery
- 3 Internal carotid artery
- 4 Medial cerebral artery
- 5 Posterior communicating artery
- 6 Posterior cerebral artery
- 7 Superior cerebellar artery
- 8 Basilar artery
- 9 Anterior inferior cerebellar artery with artery of the labyrinth
- 10 Vertebral artery
- 11 Posterior inferior cerebellar artery
- 12 Anterior spinal artery
- 13 Pia mater of spinal cord
- 14 Cerebellar tentorium
- 15 Dura mater of the cranial cavity
- 16 Spinal cord
- 17 Spinal ganglion
- 18 Spinal nerves (C₃, C₄)
- 19 Posterior root filaments (fila radicularia post.)
- 20 Ophthalmic artery (within the orbit)
- 21 Internal carotid artery (within carotid canal)

- I = Olfactory tract
- II = Optic nerve
- III = Oculomotor nerve
- IV = Trochlear nerve
- V = Trigeminal nerve
- VI = Abducent nerve
- VII = Facial nerve
- VIII = Vestibulocochlear nerve
- IX = Glossopharyngeal nerve
- X = Vagus nerve
- XI = Accessory nerve
- XII = Hypoglossus nerve

Dissection of the arterial circle of Willis at the base of the skull (superior aspect). Calvaria and brain have been removed. Red = arteries; yellow = cranial nerves (n. I–n. XII).



Arterial circle of Willis at the base of the skull (superior aspect). Red = arteries; yellow = cranial nerves (n. I–n. XII).



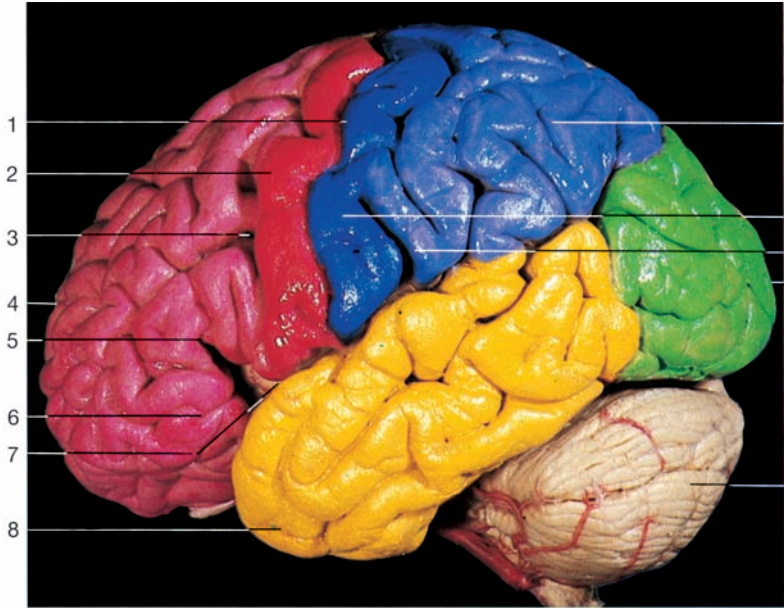
Brain, right hemisphere (medial aspect). Midbrain divided, cerebellum and inferior part of brain stem removed. Frontal pole to the left.

Red	= Frontal lobe	Dark blue	= Postcentral lobe
Blue	= Parietal lobe	Dark green	= Calcarine sulcus
Green	= Occipital lobe	Dark yellow	= Limbic cortex (cingulate and parahippocampal gyri)
Yellow	= Temporal lobe		
Dark red	= Precentral lobe		

- 1 Precentral gyrus
- 2 Precentral sulcus
- 3 Cingulate sulcus
- 4 Cingulate gyrus
- 5 Sulcus of corpus callosum
- 6 Fornix
- 7 Genu of corpus callosum
- 8 Interventricular foramen
- 9 Intermediate mass
- 10 Anterior commissure
- 11 Optic chiasma
- 12 Infundibulum
- 13 Uncus hippocampi
- 14 Postcentral gyrus
- 15 Body of corpus callosum
- 16 Third ventricle and thalamus
- 17 Stria medullaris
- 18 Parieto-occipital sulcus
- 19 Splenium of corpus callosum
- 20 Communication of calcarine and parieto-occipital sulcus
- 21 Calcarine sulcus
- 22 Pineal body
- 23 Mamillary body
- 24 Parahippocampal gyrus
- 25 Olfactory bulb
- 26 Olfactory tract
- 27 Gyrus rectus
- 28 Optic nerve
- 29 Infundibulum and optic chiasma
- 30 Optic tract
- 31 Oculomotor nerve
- 32 Pedunculus cerebri
- 33 Red nucleus
- 34 Cerebral aqueduct
- 35 Corpus callosum
- 36 Longitudinal fissure
- 37 Orbital gyri
- 38 Lateral root of olfactory tract
- 39 Medial root of olfactory tract
- 40 Olfactory tubercle and anterior perforated substance
- 41 Tuber cinereum
- 42 Interpeduncular fossa
- 43 Substantia nigra
- 44 Colliculi of the midbrain
- 45 Lateral occipitotemporal gyrus
- 46 Medial occipitotemporal gyrus

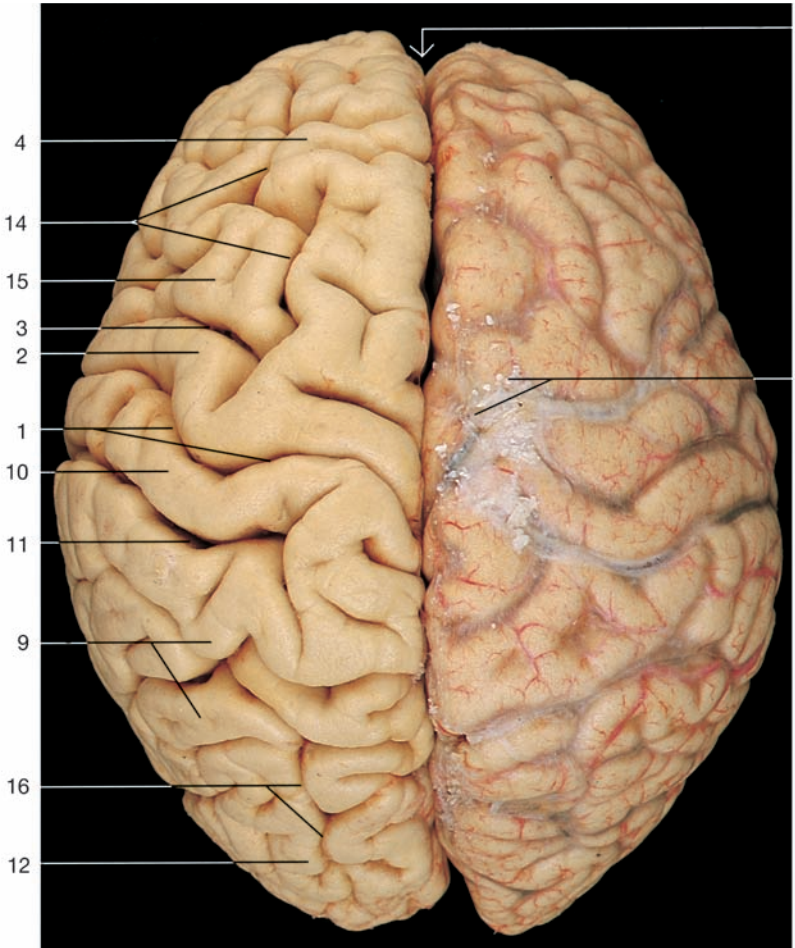


Brain (inferior aspect). Midbrain divided, cerebellum and inferior part of brain stem removed. Frontal pole at the top.



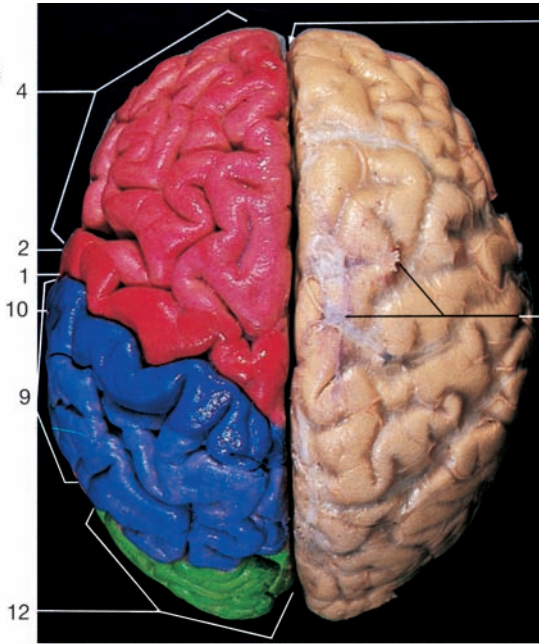
- 1 Central sulcus
- 2 Precentral gyrus
- 3 Precentral sulcus
- 4 Frontal lobe
- 5 Anterior ascending ramus of lateral sulcus
- 6 Anterior horizontal ramus of lateral sulcus
- 7 Lateral sulcus
- 8 Temporal lobe
- 9 Parietal lobe
- 10 Postcentral gyrus
- 11 Postcentral sulcus
- 12 Occipital lobe
- 13 Cerebellum
- 14 Superior frontal sulcus
- 15 Middle frontal gyrus
- 16 Lunate sulcus
- 17 Longitudinal fissure
- 18 Arachnoid granulations

Brain, left hemisphere (lateral aspect). Frontal pole to the left.

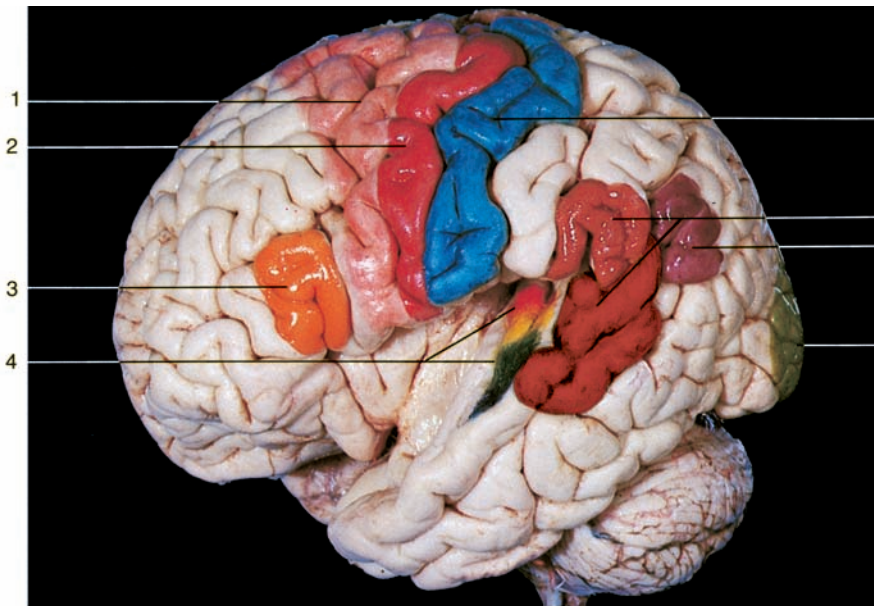


- Pink = Frontal lobe
- Blue = Parietal lobe
- Green = Occipital lobe
- Yellow = Temporal lobe
- Dark red = Precentral gyrus
- Dark blue = Postcentral gyrus

Brain (superior aspect). Right hemisphere with arachnoid and pia mater.

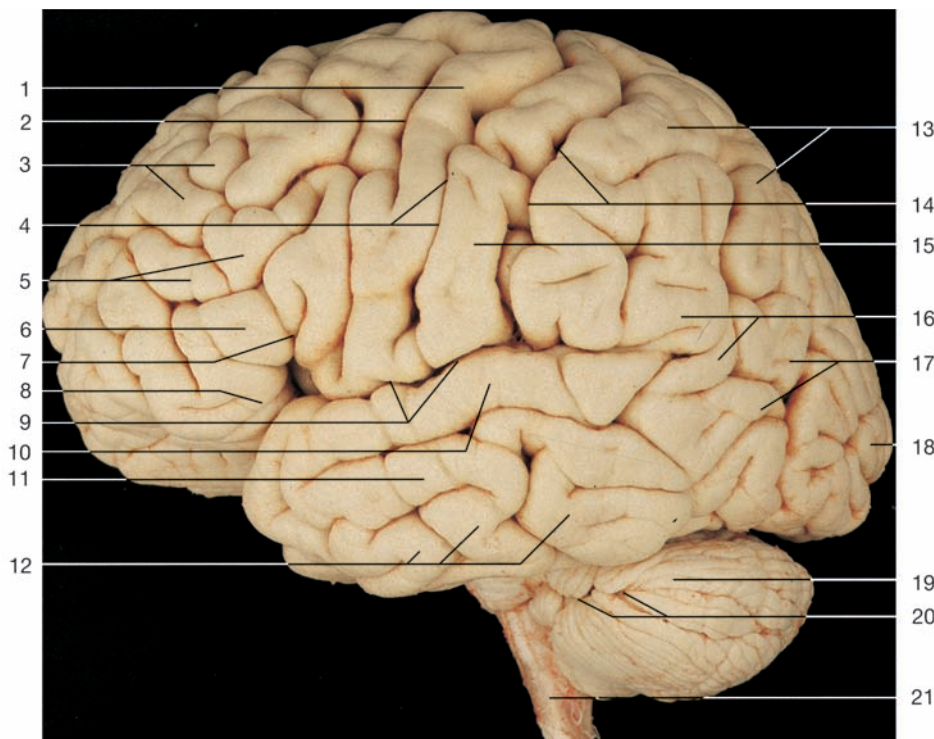


Brain (superior aspect). Lobes of the left hemisphere indicated by color; right hemisphere is covered with arachnoid and pia mater.



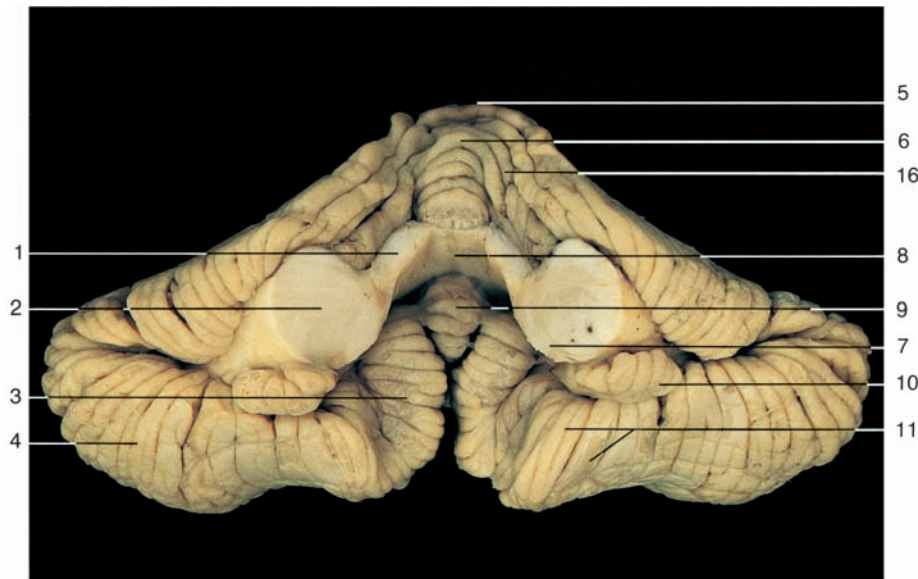
- 1 Premotor area
- 2 Somatomotor area
- 3 Motor speech area of Broca
- 4 Acoustic area
(red: high tone, dark green: low tone)
- 5 Somatosensory area
- 6 Sensory speech area of Wernicke
- 7 Reading comprehension area
- 8 Visuosensory area

Brain, left hemisphere (lateral aspect). Main cortical areas are colored.
The lateral sulcus has been opened to display the insula and the inner surface of the temporal lobe.



- 1 Precentral gyrus
- 2 Precentral sulcus
- 3 Superior frontal gyrus
- 4 Central sulcus
- 5 Middle frontal gyrus
- 6 Inferior frontal gyrus
- 7 Ascending ramus
- 8 Horizontal ramus
- 9 Posterior ramus
- 10 Superior temporal gyrus
- 11 Middle temporal gyrus
- 12 Inferior temporal gyrus
- 13 Parietal lobe
- 14 Postcentral sulcus
- 15 Postcentral gyrus
- 16 Supramarginal gyrus
- 17 Angular gyrus
- 18 Occipital lobe
- 19 Cerebellum
- 20 Horizontal fissure of cerebellum
- 21 Medulla oblongata

Brain, left hemisphere (lateral aspect). Frontal pole to the left.

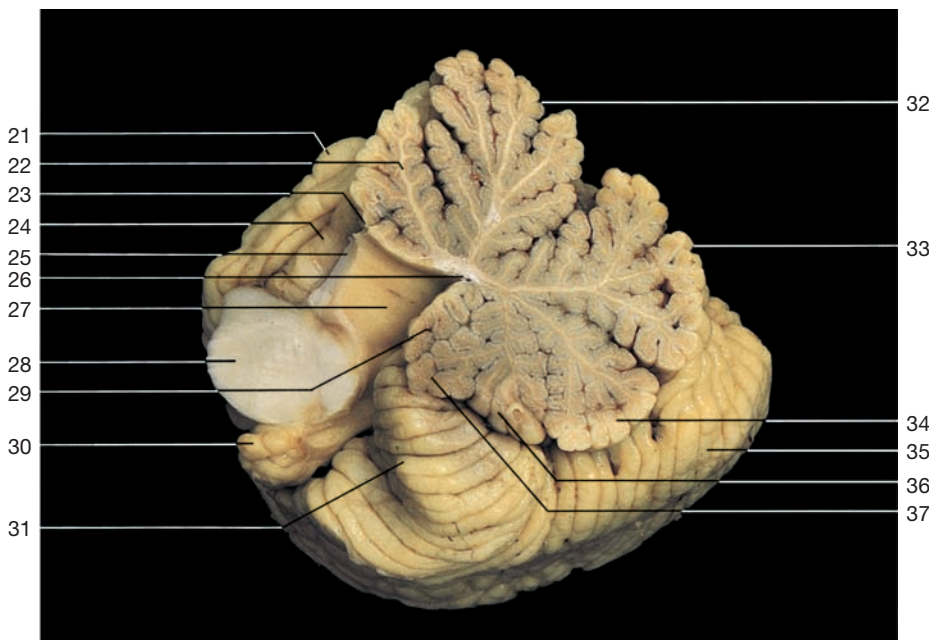


Cerebellum (infero-anterior aspect). The cerebellar peduncles have been severed.

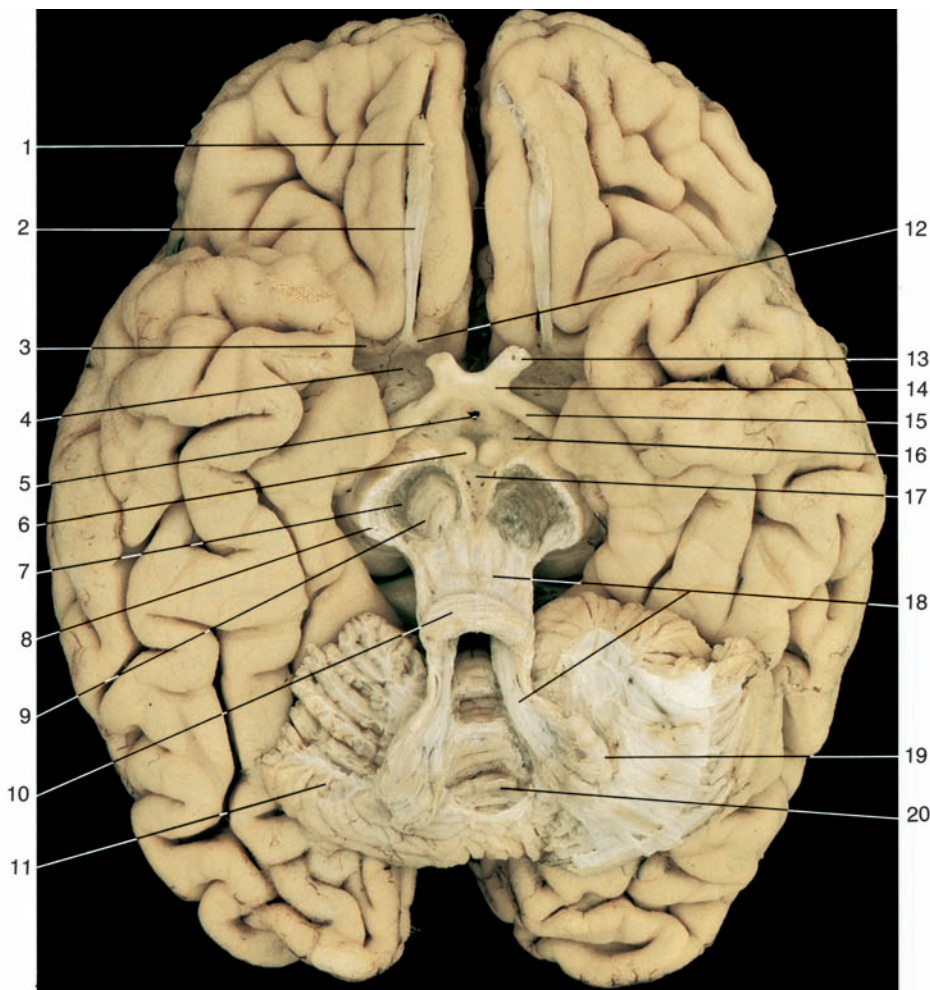
- 1 Superior cerebellar peduncle
- 2 Middle cerebellar peduncle
- 3 Cerebellar tonsil
- 4 Inferior semilunar lobule
- 5 Vermis
- 6 Central lobule of vermis
- 7 Inferior cerebellar peduncle
- 8 Superior medullary velum
- 9 Nodule of vermis
- 10 Flocculus of cerebellum
- 11 Biventral lobule
- 12 Left cerebellar hemisphere
- 13 Inferior semilunar lobule
- 14 Biventral lobule
- 15 Vermis of cerebellum
- 16 Tuber of vermis
- 17 Pyramid of vermis
- 18 Uvula of vermis
- 19 Tonsil of cerebellum
- 20 Flocculus of cerebellum
- 21 Right cerebellar hemisphere
- 22 Vermis (central lobule)
- 23 Cerebellar lingula
- 24 Ala of central lobule
- 25 Superior cerebellar peduncle
- 26 Fastigium
- 27 Fourth ventricle
- 28 Middle cerebellar peduncle
- 29 Nodule of vermis
- 30 Flocculus of cerebellum
- 31 Cerebellar tonsil
- 32 Culmen of vermis
- 33 Declive of vermis
- 34 Tuber of vermis
- 35 Inferior semilunar lobule
- 36 Pyramid of vermis (cut)
- 37 Uvula of vermis



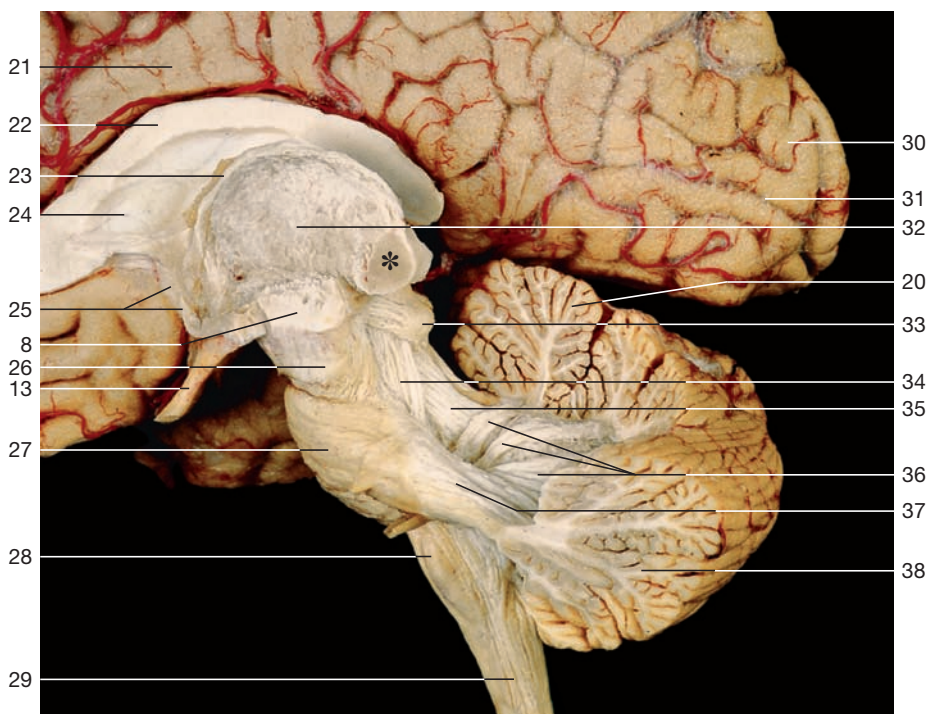
Cerebellum (infero-posterior aspect).



Median section through the cerebellum. Right cerebellar hemisphere and right half of vermis.

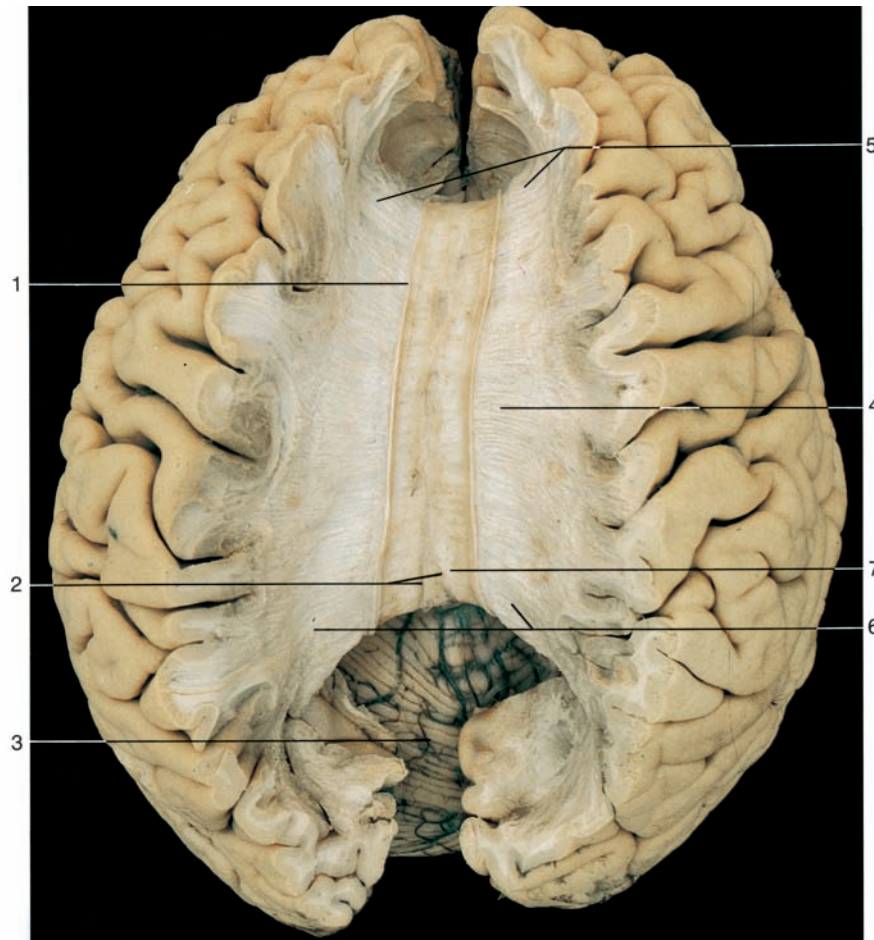


Brain and cerebellum (inferior aspect). Parts of the cerebellum have been removed to display the dentate nucleus and the main pathway to the midbrain (cerebellorubral tract).



Dissection of the cerebellar peduncles and their connection with midbrain and diencephalon. A small part of pulvinar thalami (*) has been cut to show inferior brachium.

- 1 Olfactory bulb
- 2 Olfactory tract
- 3 Lateral olfactory stria
- 4 Anterior perforated substance
- 5 Infundibulum (divided)
- 6 Mamillary body
- 7 Substantia nigra
- 8 Cerebral peduncle (cut)
- 9 Red nucleus
- 10 Decussation of superior cerebellar peduncle
- 11 Cerebellar hemisphere
- 12 Medial olfactory stria
- 13 Optic nerve
- 14 Optic chiasma
- 15 Optic tract
- 16 Posterior perforated substance
- 17 Interpeduncular fossa
- 18 Superior cerebellar peduncle and cerebellorubral tract
- 19 Dentate nucleus
- 20 Vermis of cerebellum
- 21 Cingulate gyrus
- 22 Corpus callosum
- 23 Stria terminalis
- 24 Septum pellucidum
- 25 Columna fornicis
- 26 Cerebral peduncle at midbrain level
- 27 Pons
- 28 Inferior olive
- 29 Medulla oblongata with lateral pyramidal tract
- 30 Occipital lobe
- 31 Calcarine sulcus
- 32 Thalamus
- 33 Inferior colliculus with brachium
- 34 Medial lemniscus
- 35 Superior cerebellar peduncle
- 36 Inferior cerebellar peduncle
- 37 Middle cerebellar peduncle
- 38 Cerebellar hemisphere



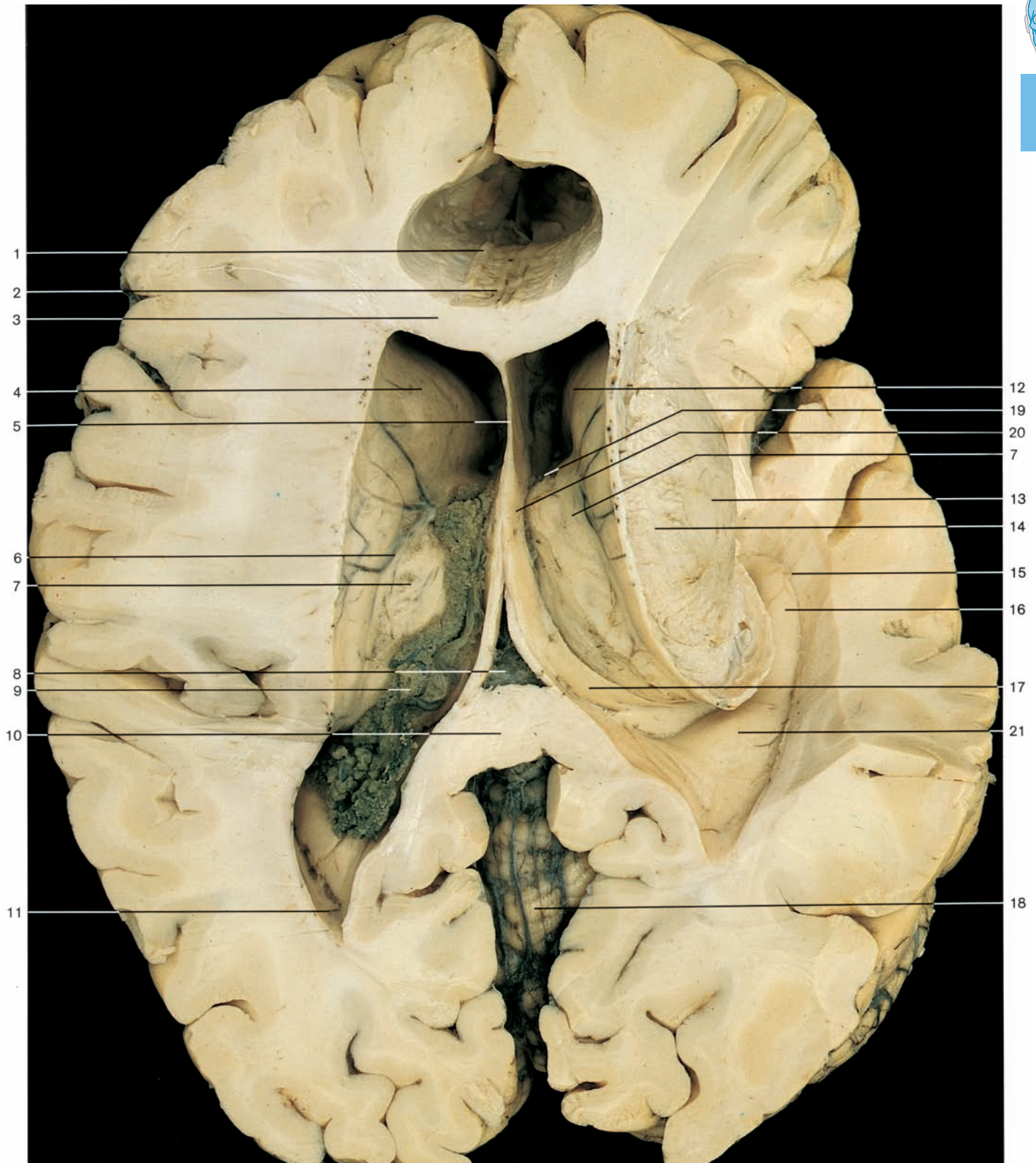
- 1 Lateral longitudinal stria of indusium griseum
- 2 Medial longitudinal stria of indusium griseum
- 3 Cerebellum
- 4 Radiating fibers of the corpus callosum
- 5 Forceps minor of corpus callosum
- 6 Forceps major of corpus callosum
- 7 Splenium of corpus callosum

Dissection of the brain I. The fiber system of the corpus callosum has been displayed by removing the cortex lying above it. Frontal pole at the top.



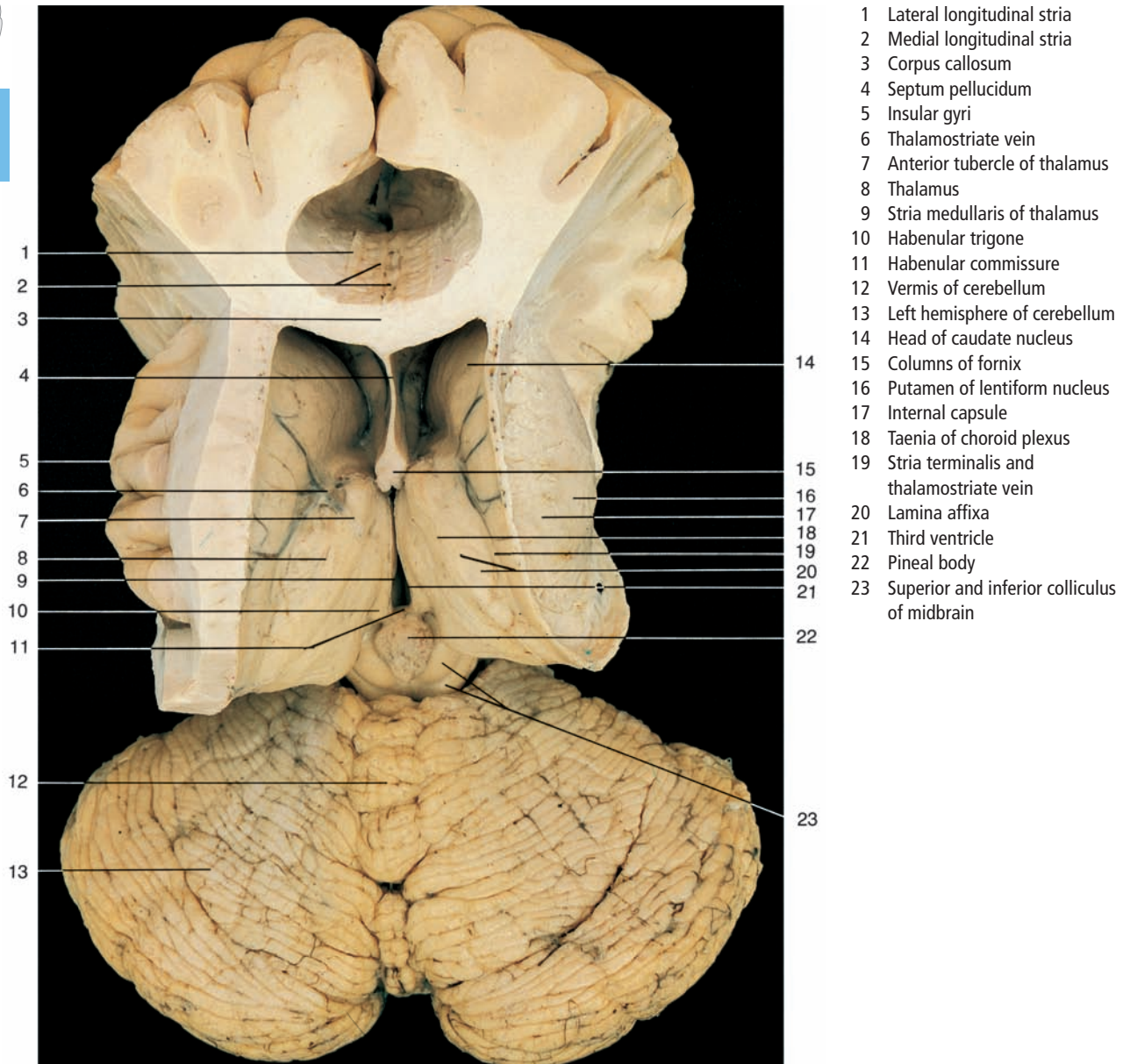
- 1 Longitudinal cerebral fissure
- 2 Genu of corpus callosum
- 3 Head of caudate nucleus and anterior horn of lateral ventricle
- 4 Cavum of septum pellucidum
- 5 Septum pellucidum
- 6 Stria terminalis
- 7 Choroid plexus of lateral ventricle
- 8 Splenium of corpus callosum
- 9 Calcar avis
- 10 Posterior horn of lateral ventricle
- 11 Thalamus (lamina affixa)
- 12 Commissure of fornix
- 13 Vermis of cerebellum

Dissection of the brain II. The lateral ventricles and subcortical nuclei of the brain are dissected. The corpus callosum has been partly removed. Frontal pole at the top.

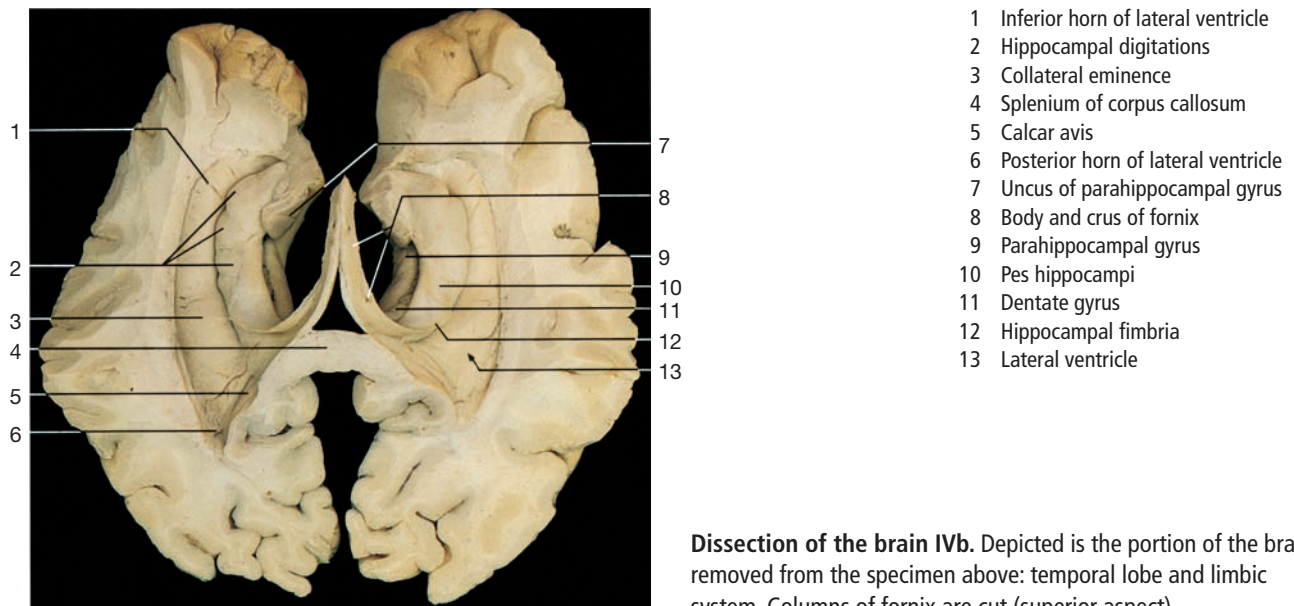


Dissection of the brain III (superior aspect of lateral ventricle and subcortical nuclei of the brain). Corpus callosum partly removed. At right, the entire lateral ventricle has been opened, the insula with claustrum and the extreme and external capsules have been removed, exposing the lentiform nucleus and the internal capsule.

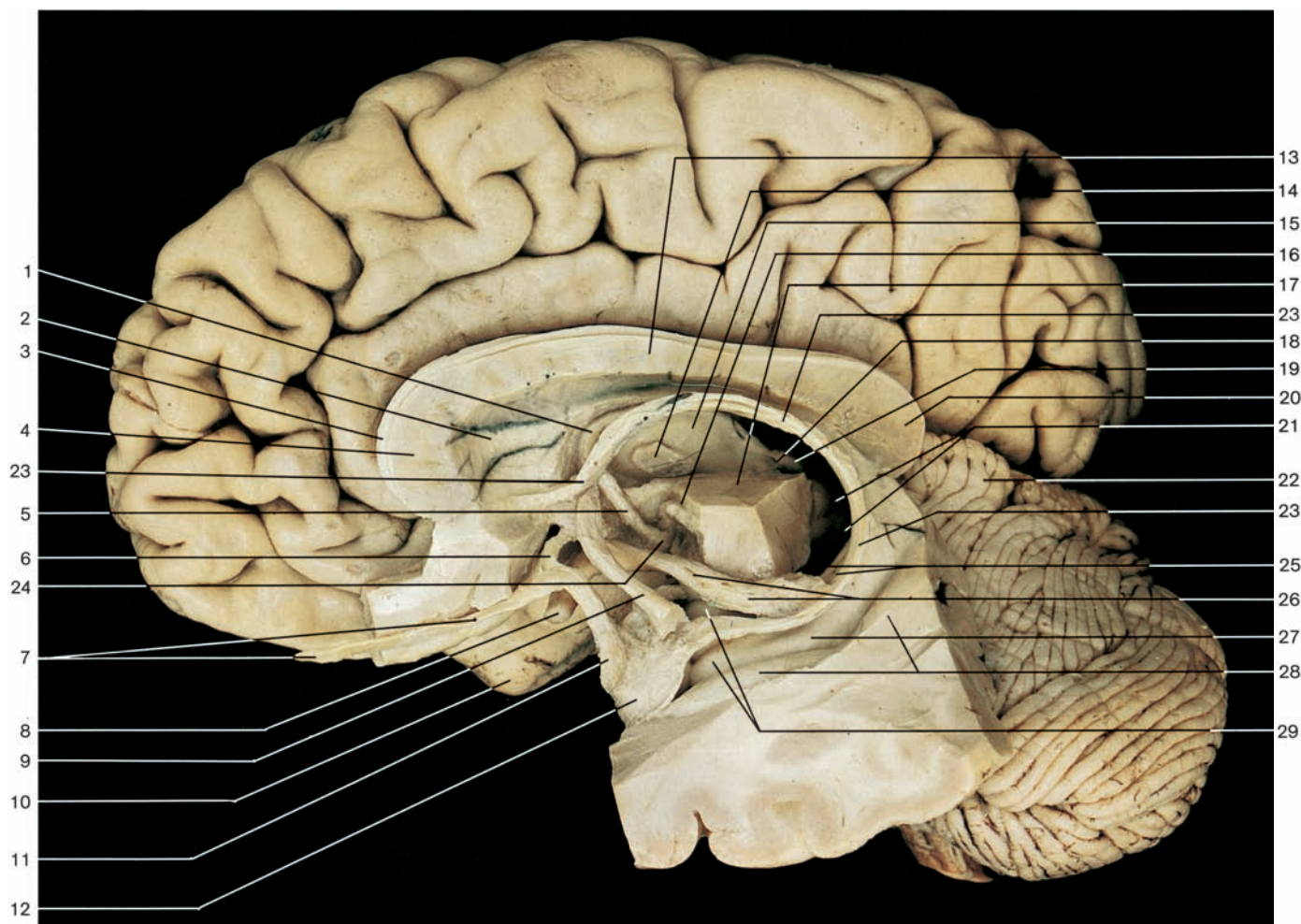
- | | | |
|-------------------------------------|---|--|
| 1 Lateral longitudinal stria | 9 Choroid plexus of lateral ventricle | 16 Pes hippocampi |
| 2 Medial longitudinal stria | 10 Splenium of corpus callosum | 17 Crus of fornix |
| 3 Genu of corpus callosum | 11 Posterior horn of lateral ventricle | 18 Vermis of cerebellum with arachnoid and pia mater |
| 4 Head of caudate nucleus | 12 Anterior horn of lateral ventricle (head of caudate nucleus) | 19 Interventricular foramen |
| 5 Septum pellucidum | 13 Putamen of lentiform nucleus | 20 Right column of fornix |
| 6 Stria terminalis | 14 Internal capsule | 21 Collateral eminence |
| 7 Thalamus (lamina affixa) | 15 Inferior horn of lateral ventricle | |
| 8 Choroid plexus of third ventricle | | |



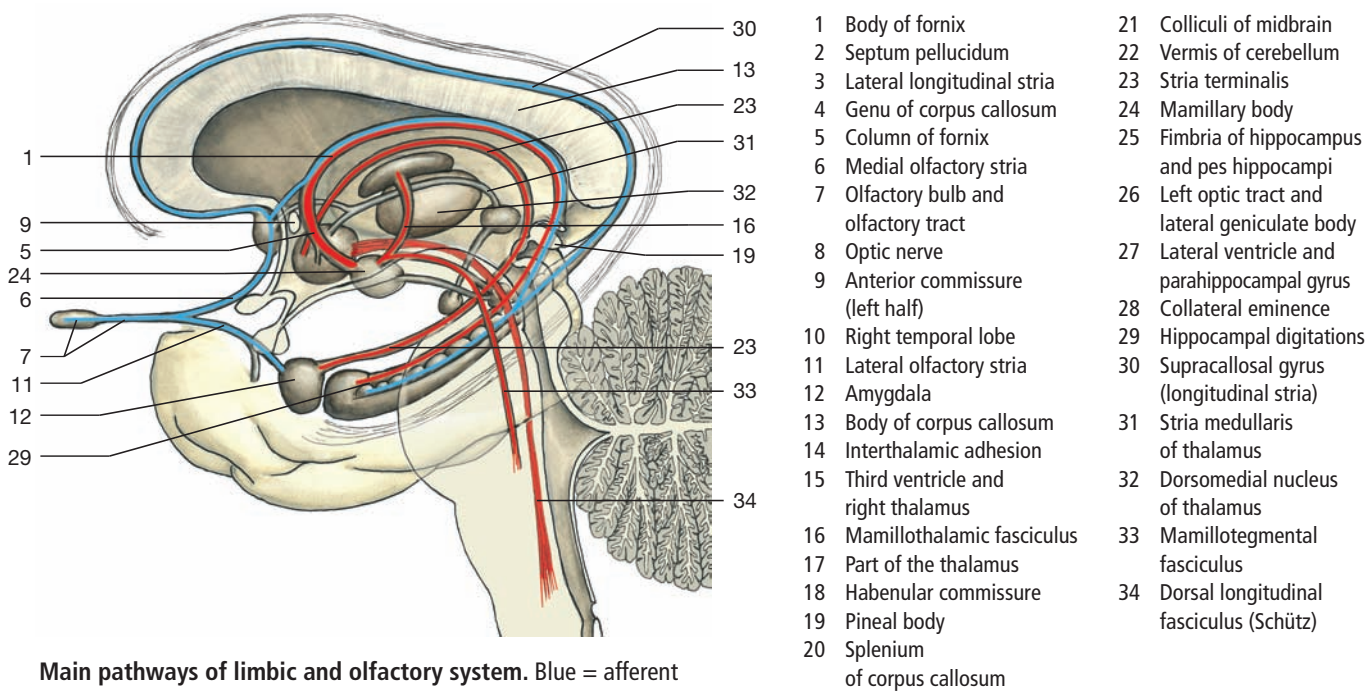
Dissection of the brain IVa. Temporal lobe, fornix, and the posterior corpus callosum have been removed (this part of the specimen is depicted below). Frontal pole at the top (superior aspect).



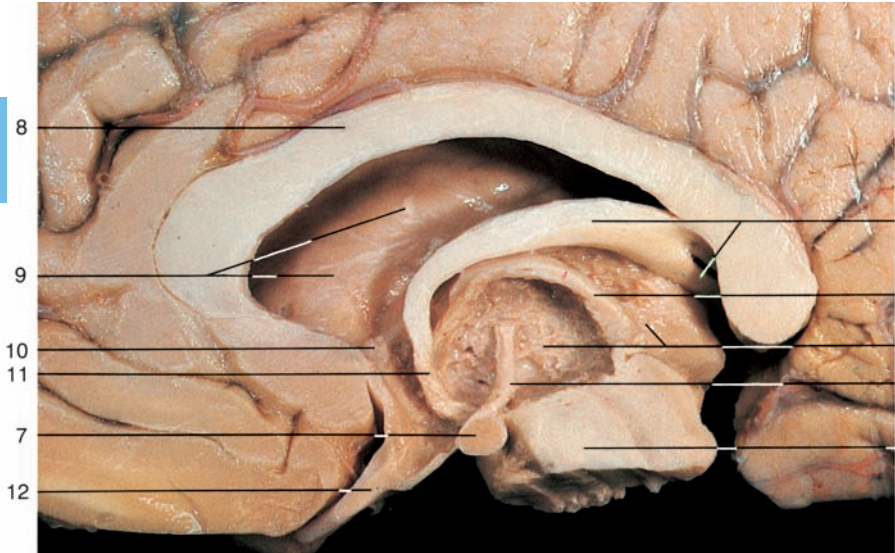
Dissection of the brain IVb. Depicted is the portion of the brain removed from the specimen above: temporal lobe and limbic system. Columns of fornix are cut (superior aspect).



Dissection of the limbic system (left side, lateral aspect). Corpus callosum has been cut in the median plane. The left thalamus and the left hemisphere have been partly removed.

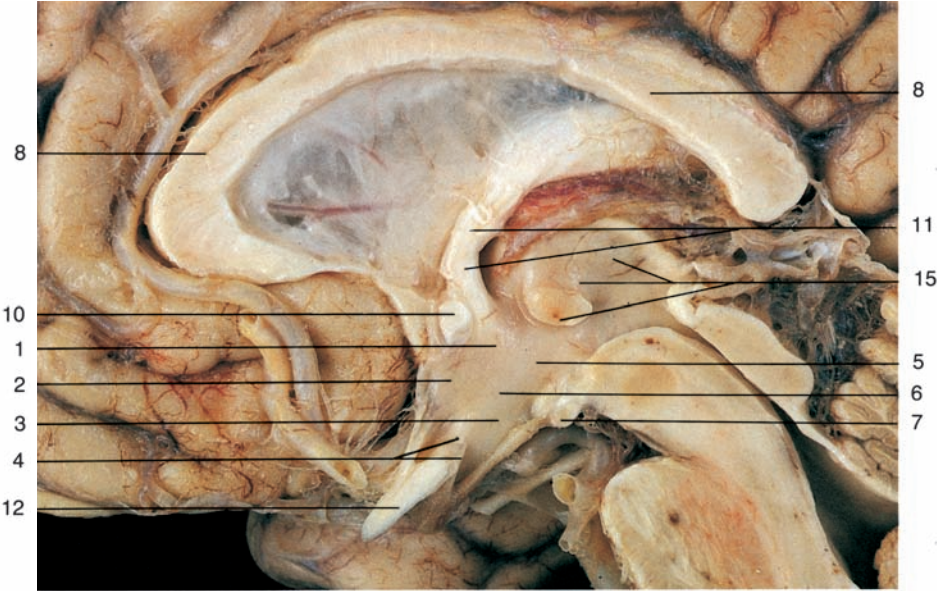


Main pathways of limbic and olfactory system. Blue = afferent pathways; red = efferent pathways.

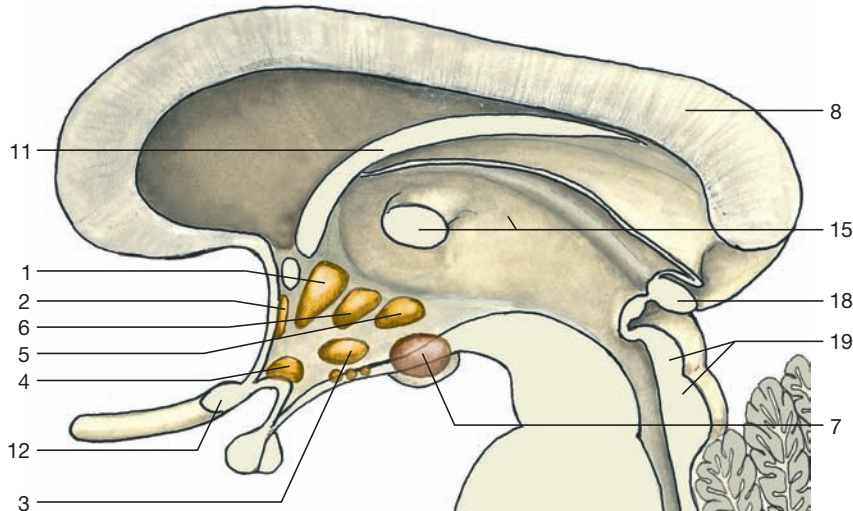


Median section through the diencephalon. Medial part of the thalamus and septum pellucidum have been removed to show the fornix and mamillothalamic fasciculus.

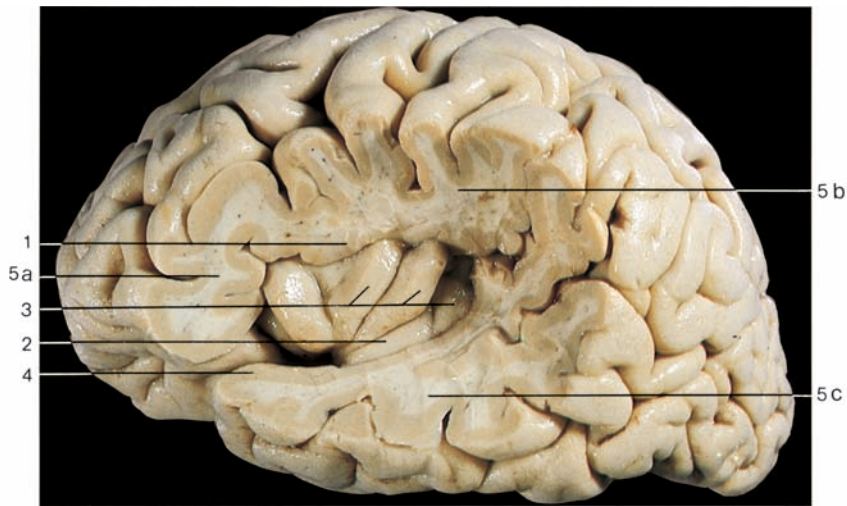
- | | | |
|----|---|-----------------------|
| 1 | Paraventricular nucleus | } Hypothalamic nuclei |
| 2 | Pre-optic nucleus | |
| 3 | Ventromedial nucleus | |
| 4 | Supra-optic nucleus | |
| 5 | Posterior nucleus | |
| 6 | Dorsomedial nucleus | |
| 7 | Mamillary body | |
| 8 | Corpus callosum | |
| 9 | Lateral ventricle (showing caudate nucleus) | |
| 10 | Anterior commissure | |
| 11 | Column of fornix | |
| 12 | Optic chiasma | |
| 13 | Crus of fornix | |
| 14 | Stria medullaris of thalamus | |
| 15 | Thalamus and interthalamic adhesion | |
| 16 | Mamillothalamic fasciculus of Vicq d'Azyr | |
| 17 | Cerebral peduncle | |
| 18 | Pineal body | |
| 19 | Tectum of midbrain | |



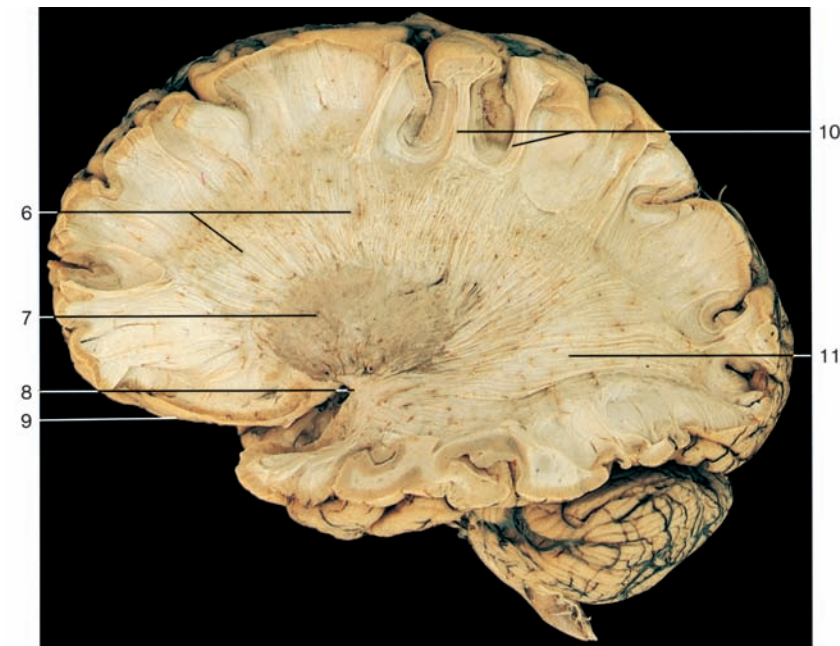
Median section through diencephalon and midbrain. Location of the hypothalamic nuclei.



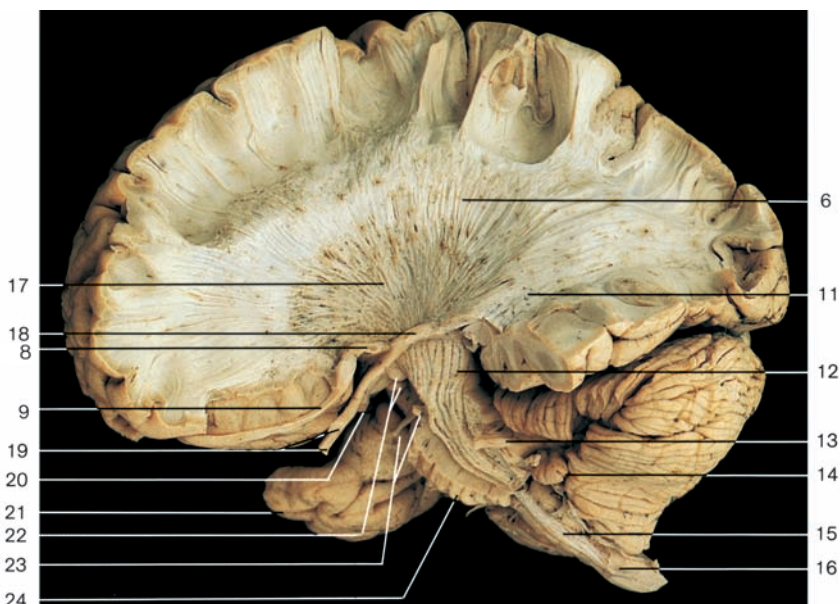
Location of the main hypothalamic nuclei.



Insula (Reili), left hemisphere. The opercula of the frontal, parietal, and temporal lobes have been removed to display the insular gyri.

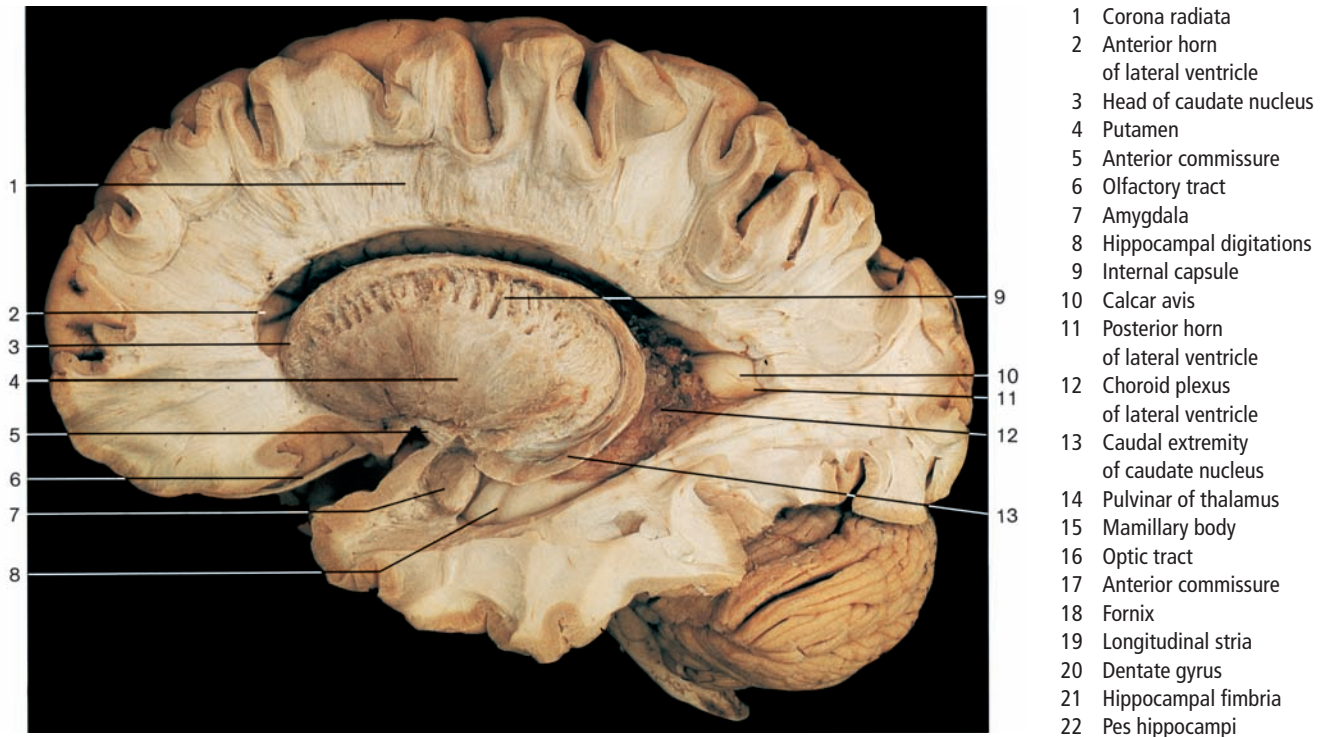


Corona radiata, left hemisphere. Frontal pole to the left.

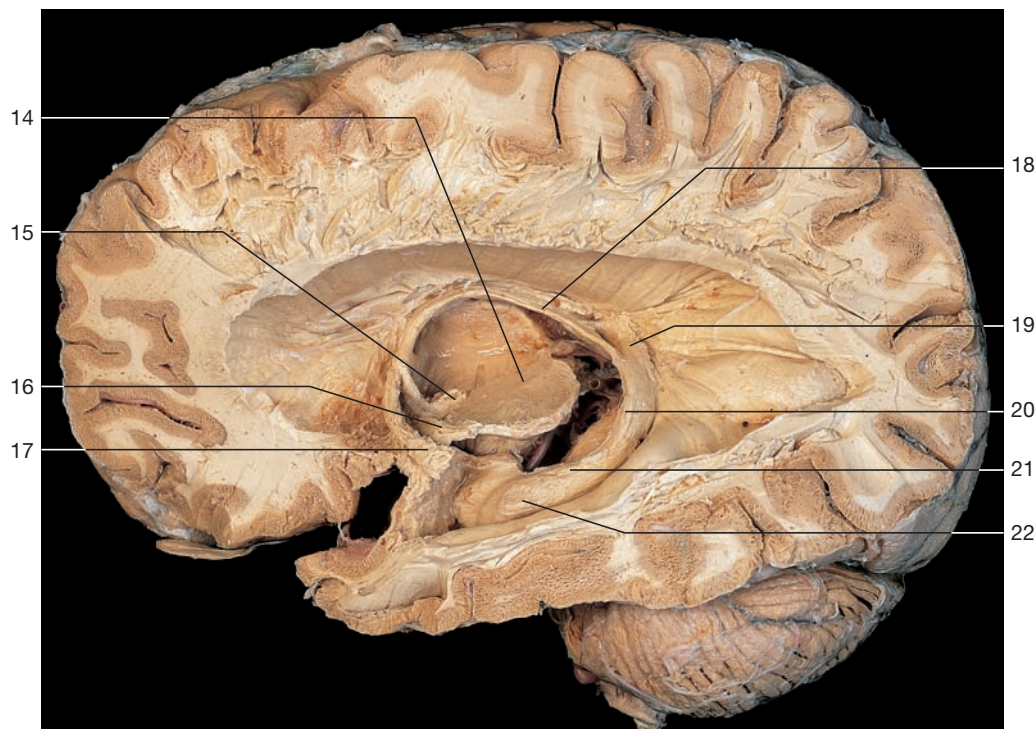


- 1 Circular sulcus of insula
- 2 Long gyrus of insula
- 3 Short gyri of insula
- 4 Limen insulae
- 5 Opercula (cut)
 - a Frontal operculum
 - b Frontoparietal operculum
 - c Temporal operculum
- 6 Corona radiata
- 7 Lentiform nucleus
- 8 Anterior commissure
- 9 Olfactory tract
- 10 Cerebral arcuate fibers
- 11 Optic radiation
- 12 Cerebral peduncle
- 13 Trigeminal nerve (n. V)
- 14 Flocculus of cerebellum
- 15 Pyramidal tract
- 16 Decussation of pyramidal tract
- 17 Internal capsule
- 18 Optic tract
- 19 Optic nerve (n. II)
- 20 Infundibulum
- 21 Temporal lobe (right side)
- 22 Mamillary bodies
- 23 Oculomotor nerve (n. III)
- 24 Transverse fibers of pons

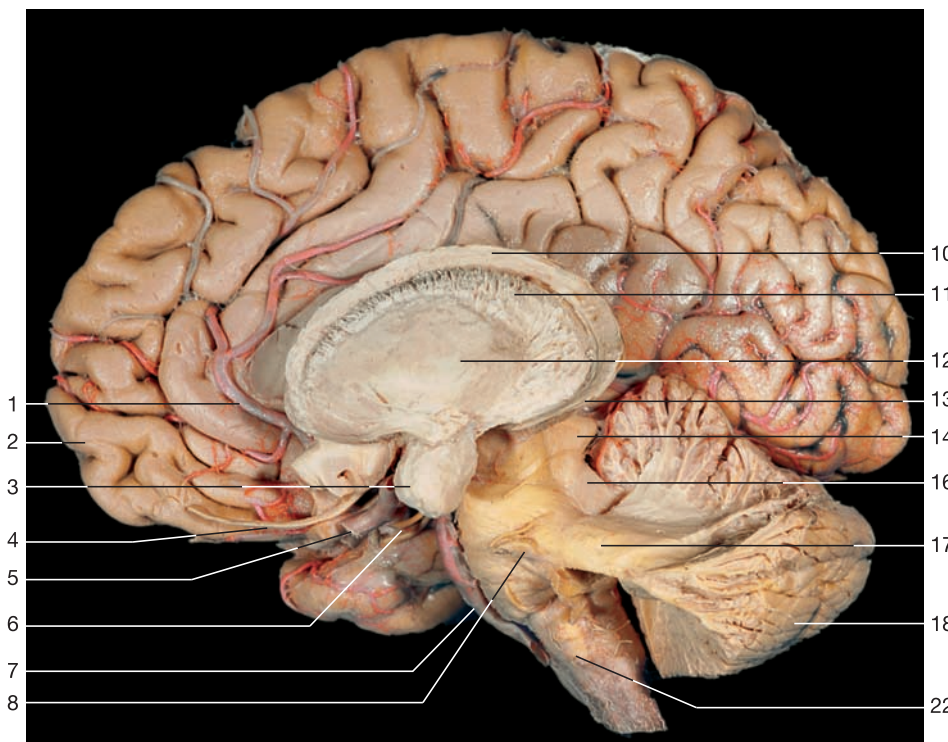
◁ **Corona radiata and internal capsule, left hemisphere.** Lentiform nucleus removed. Frontal pole to the left.



Dissection of the subcortical nuclei and internal capsule, left hemisphere (lateral aspect). The lateral ventricle has been opened, and the insular gyri and claustrum have been removed, revealing the lentiform nucleus and the internal capsule. Frontal pole to the left.

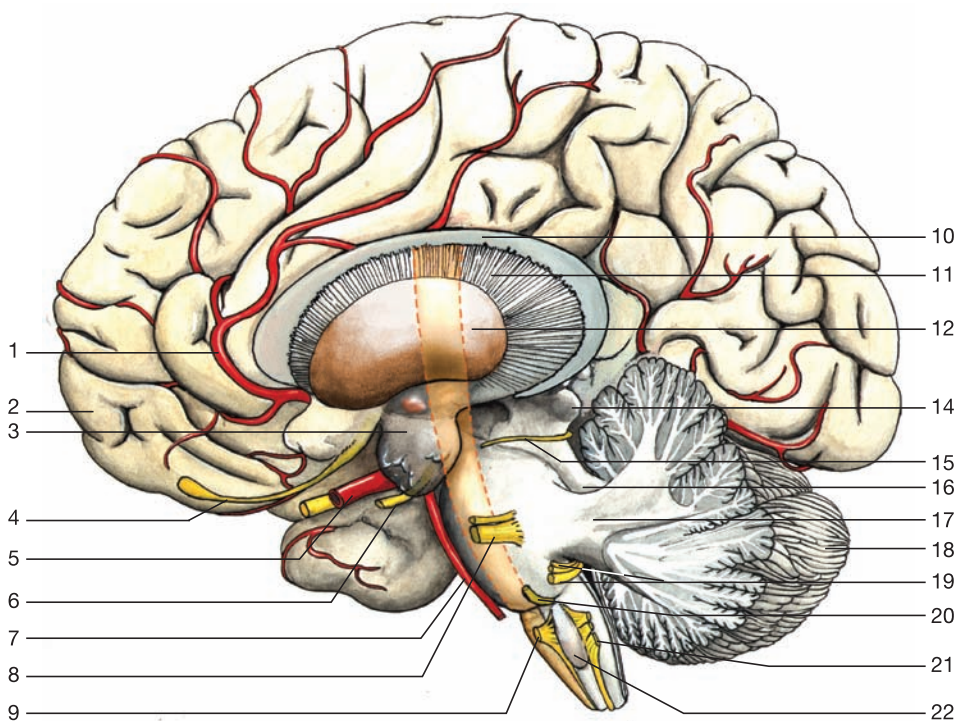


Dissection of the limbic system and fornix, left hemisphere (lateral aspect). Frontal pole to the left.

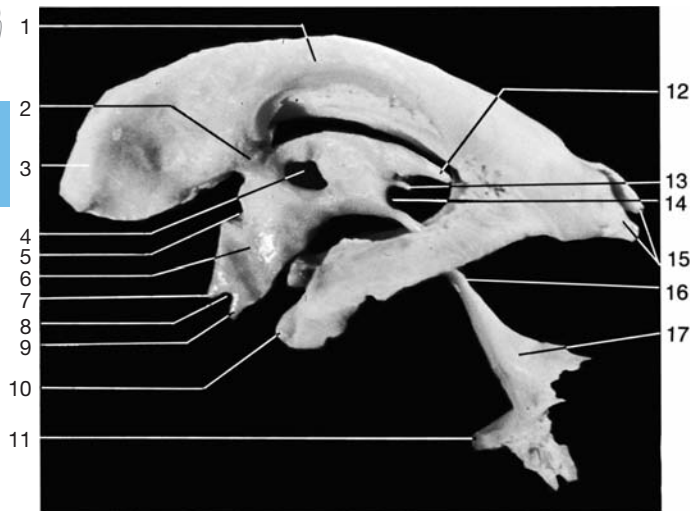


- 1 Anterior cerebral artery
- 2 Frontal lobe
- 3 Amygdala (amygdaloid body)
- 4 Olfactory tract
- 5 Internal carotid artery
- 6 Oculomotor nerve (n. III)
- 7 Basilar artery
- 8 Trigeminal nerve (n. V)
- 9 Hypoglossal nerve (n. XII)
- 10 Caudate nucleus
- 11 Internal capsule
- 12 Lentiform nucleus
- 13 Caudal extremity of caudate nucleus
- 14 Inferior colliculus of midbrain
- 15 Trochlear nerve (n. IV)
- 16 Superior cerebellar peduncle
- 17 Middle cerebellar peduncle
- 18 Cerebellum
- 19 Facial nerve (n. VII) and vestibulocochlear nerve (n. VIII)
- 20 Abducent nerve (n. VI)
- 21 Glossopharyngeal nerve (n. IX), vagus nerve (n. X), and accessory nerve (n. XI)
- 22 Inferior olive

Dissection of the brain stem and cerebellum (lateral aspect). The connections of the brain stem with the cerebellum are dissected. The amygdala of the left hemisphere is shown. The corpus callosum has been partly removed. Frontal pole to the left.

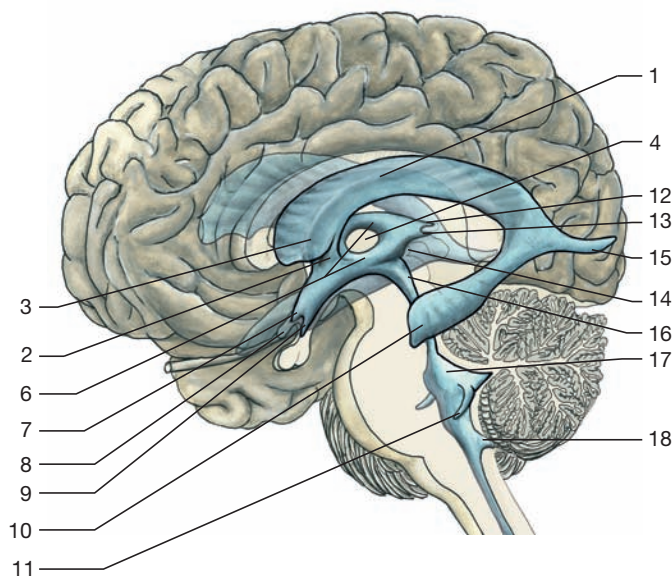


Schematic drawing of the dissected brain stem and cerebellum shown above (lateral aspect). The course of the pyramidal tracts is indicated in red. Yellow = cranial nerves.

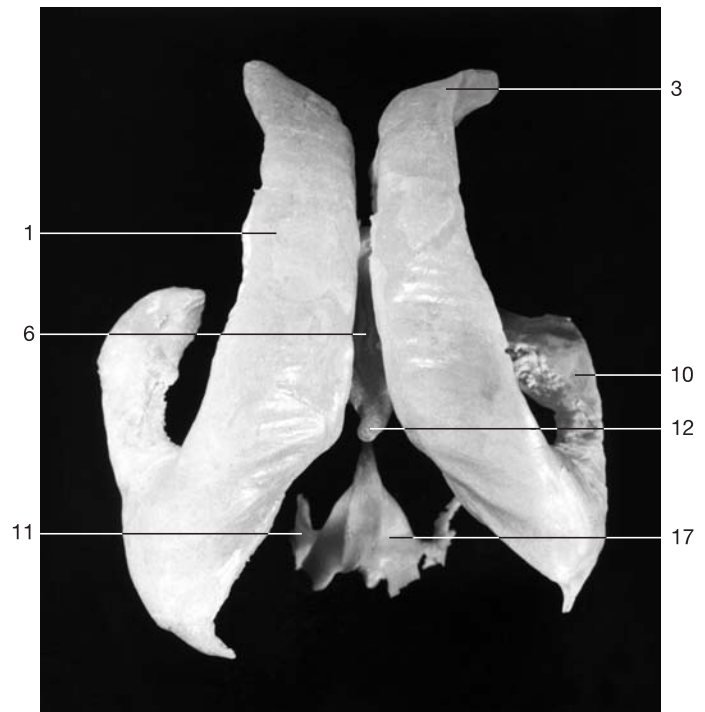


Cast of ventricular cavities of the brain (lateral aspect).
Frontal pole to the left.

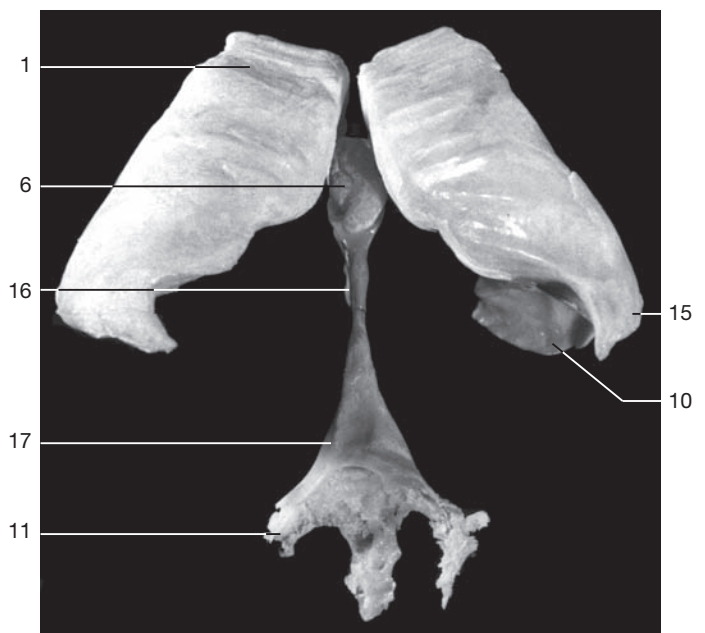
- 1 Central part of the lateral ventricle
- 2 Interventricular foramen of Monro
- 3 Anterior horn of the lateral ventricle
- 4 Site of interthalamic adhesion
- 5 Notch for anterior commissure
- 6 Third ventricle
- 7 Optic recess
- 8 Notch for optic chiasma
- 9 Infundibular recess
- 10 Inferior horn of lateral ventricle with indentation of amygdaloid body
- 11 Lateral recess and lateral aperture of Luschka
- 12 Suprapineal recess
- 13 Pineal recess
- 14 Notch for posterior commissure
- 15 Posterior horn of lateral ventricle
- 16 Cerebral aqueduct
- 17 Fourth ventricle
- 18 Median aperture of Magendie



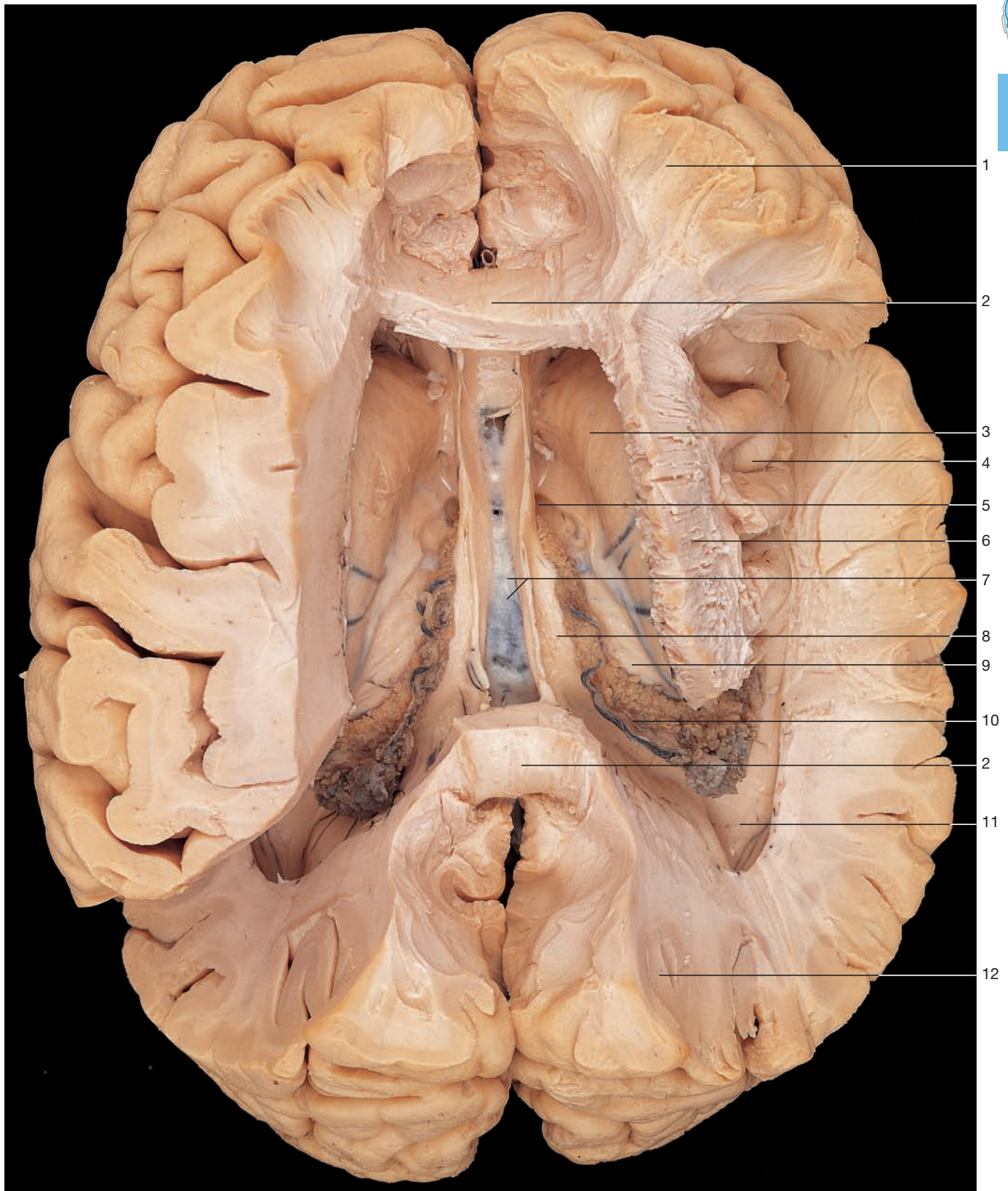
Position of ventricular cavities.



Cast of ventricular cavities of the brain (superior aspect).
Frontal pole at the top.

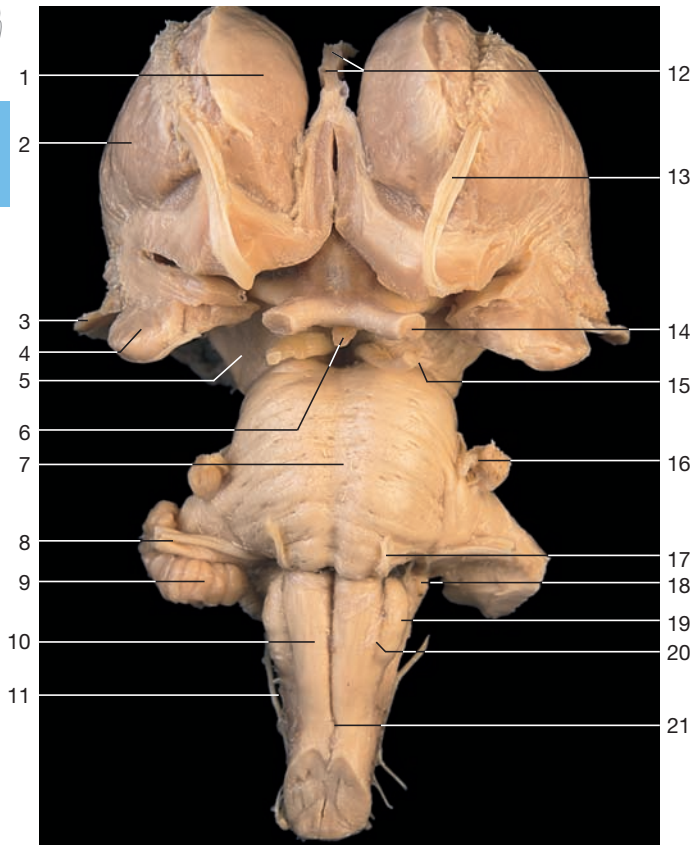


Cast of ventricular cavities of the brain and cerebral aqueduct (posterior aspect). Posterior horns of the lateral ventricles (15) are shown. Fourth ventricle (17) from below.



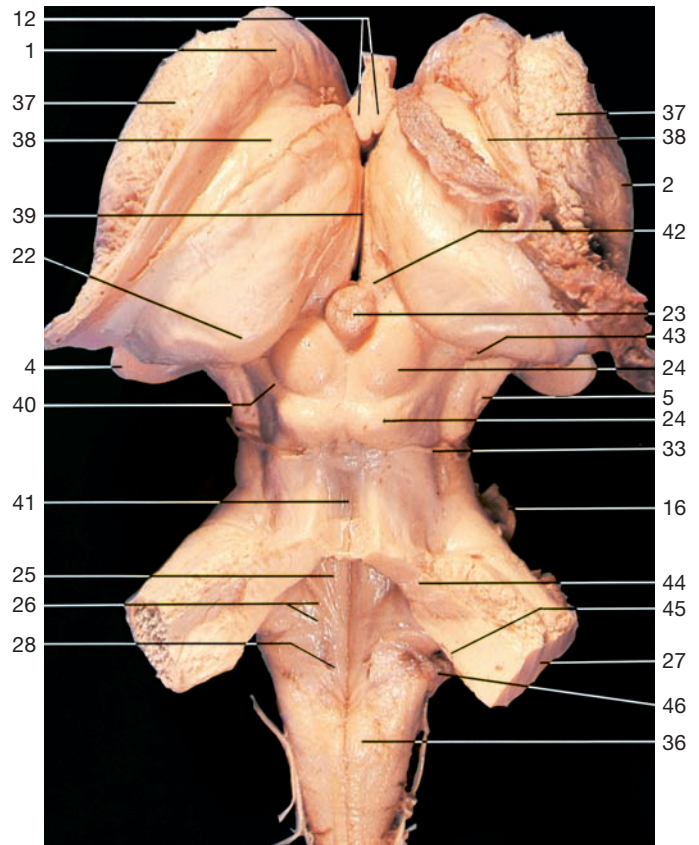
Dissection of the brain (superior aspect of the lateral ventricle and of the subcortical nuclei of the brain). Corpus callosum partly removed. Fornix and choroid plexus of the left lateral ventricle are shown.

- | | |
|----------------------------|---------------------------------------|
| 1 Frontal lobe of brain | 7 Choroid plexus of third ventricle |
| 2 Corpus callosum | 8 Body of fornix |
| 3 Caudate nucleus (head) | 9 Thalamus |
| 4 Insular cortex | 10 Choroid plexus |
| 5 Interventricular foramen | 11 Lateral ventricle (occipital horn) |
| 6 Internal capsule | 12 Occipital lobe of brain |



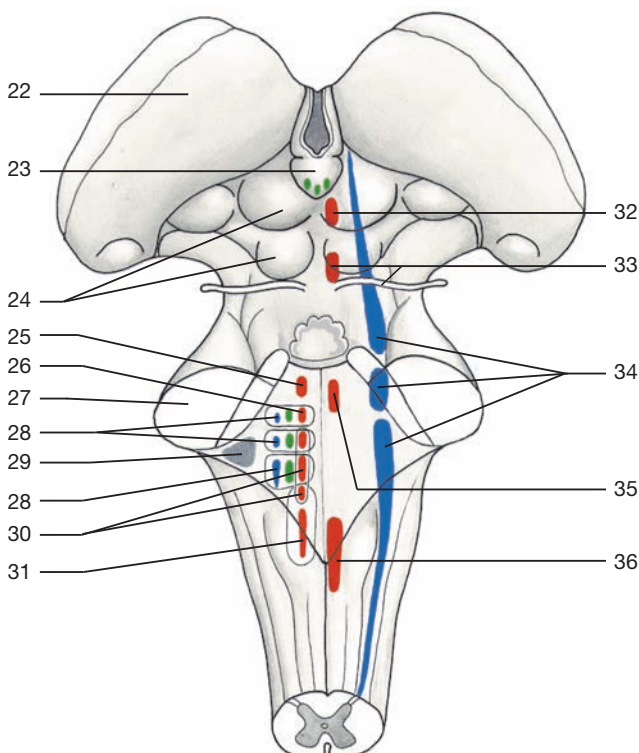
Brain stem (anterior aspect). Cerebrum removed.

- | | |
|---------------------------------------|---|
| 1 Caudate nucleus | 8 Facial and vestibulocochlear nerves (n. VII, n. VIII) |
| 2 Lentiform nucleus | 9 Cerebellar flocculus |
| 3 Caudal extremity of caudate nucleus | 10 Medulla oblongata |
| 4 Amygdaloid body | 11 Accessory nerve (n. XI) |
| 5 Cerebral peduncle | 12 Fornix and column of fornix |
| 6 Infundibulum | 13 Olfactory tract |
| 7 Pons | 14 Optic nerve (n. II) |



Brain stem (posterior aspect). Cerebellum removed.

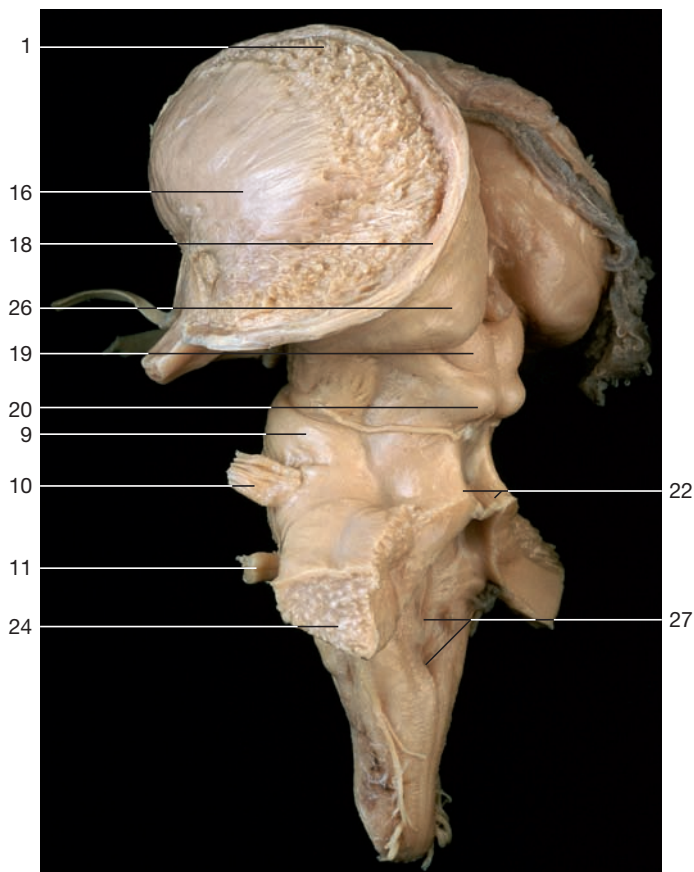
- | | |
|--|---|
| 15 Oculomotor nerve (n. III) | 16 Trigeminal nerve (n. V) |
| 17 Abducent nerve (n. VI) | 18 Glossopharyngeal and vagus nerves (n. IX, n. X) |
| 19 Inferior olive | 20 Hypoglossal nerve (n. XII) |
| 21 Decussation of the pyramids | 22 Thalamus |
| 23 Epiphysis | 24 Tectum of midbrain (superior and inferior colliculus) |
| 25 Motor nucleus of trigeminal nerve (n. V) | 26 Facial nucleus (n. VII) |
| 27 Middle cerebellar peduncle | 28 Visceral nucleus of glossopharyngeal and vagus nerves (n. IX and n. X), salivatory nucleus |
| 29 Vestibular nucleus (n. VIII) | 30 Ambiguous nucleus (n. IX, n. X, n. XI) |
| 31 Spinal nucleus of accessory nerve (n. XI) | 32 Motor nucleus of oculomotor nerve (n. III) |
| 33 Trochlear nucleus and nerve (n. IV) | 34 Sensory nucleus of trigeminal nerve (n. V) |
| 35 Abducent nucleus (n. VI) | 36 Hypoglossal nucleus (n. XII) |
| 37 Internal capsule | 38 Lamina affixa |
| 39 Third ventricle | 40 Brachium of inferior colliculus |
| 41 Superior medullary velum | 42 Habenular trigone |
| 43 Medial geniculate body | 44 Superior cerebellar peduncle |
| 45 Inferior cerebellar peduncle | 46 Choroid plexus of fourth ventricle |



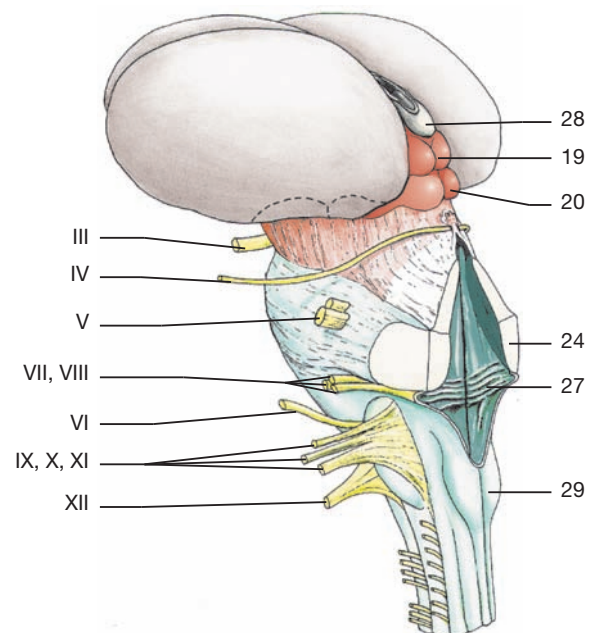
Brain stem (posterior aspect). Location of cranial nerve nuclei.



Brain stem (left lateral aspect). Cerebellar peduncles have been severed, cerebellum and cerebral cortex have been removed.

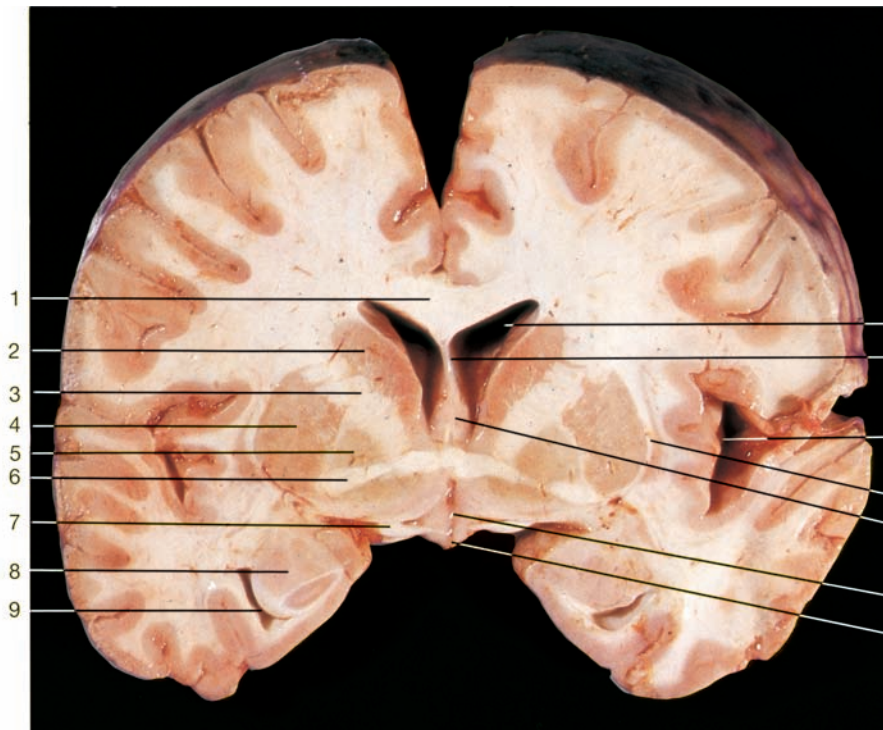


Brain stem (dorso-lateral aspect). Cerebellum removed.



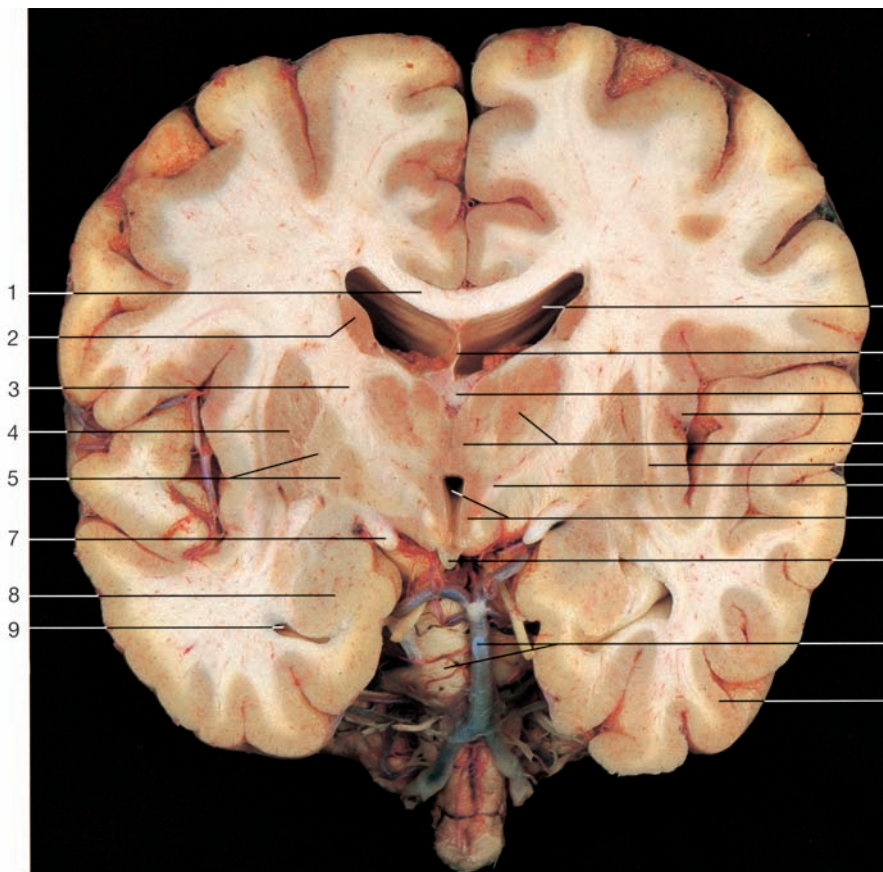
Brain stem (lateral aspect). Note the location of the cranial nerves. III–XII = cranial nerves.

- 1 Internal capsule
- 2 Head of the caudate nucleus
- 3 Olfactory trigone
- 4 Olfactory tracts
- 5 Optic nerves (n. II)
- 6 Infundibulum
- 7 Oculomotor nerve (n. III)
- 8 Amygdaloid body
- 9 Pons
- 10 Trigeminal nerve (n. V)
- 11 Facial and vestibulocochlear nerves (n. VII, n. VIII)
- 12 Hypoglossal nerve (n. XII)
- 13 Glossopharyngeal and vagus nerves (n. IX, n. X)
- 14 Inferior olive
- 15 Medulla oblongata
- 16 Lentiform nucleus
- 17 Anterior commissure
- 18 Tail of caudate nucleus
- 19 Superior colliculus
- 20 Inferior colliculus
- 21 Trochlear nerve (n. IV)
- 22 Superior cerebellar peduncle
- 23 Inferior cerebellar peduncle
- 24 Middle cerebellar peduncle
- 25 Accessory nerve (n. XI)
- 26 Pulvinar of thalamus
- 27 Striae medullares and rhomboid fossa
- 28 Pineal body
- 29 Clava



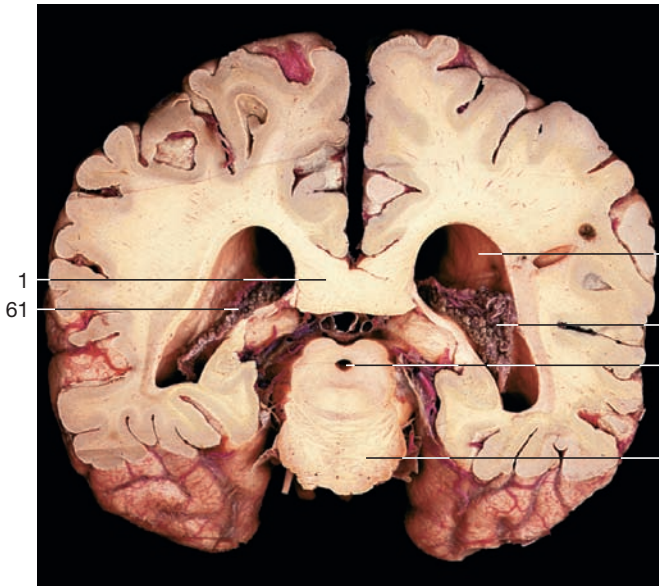
Coronal section through the brain at the level of the anterior commissure.
Section 1.

- 1 Corpus callosum
- 2 Head of caudate nucleus
- 3 Internal capsule
- 4 Putamen
- 5 Globus pallidus
- 6 Anterior commissure
- 7 Optic tract
- 8 Amygdaloid body
- 9 Inferior horn of lateral ventricle
- 10 Lateral ventricle
- 11 Septum pellucidum
- 12 Lobus insularis (insula)
- 13 External capsule
- 14 Column of fornix
- 15 Optic recess
- 16 Infundibulum
- 17 Thalamus
- 18 Claustrum
- 19 Lenticular ansa
- 20 Third ventricle and hypothalamus
- 21 Basilar artery and pons
- 22 Cortex of temporal lobe
- 23 Inferior colliculus
- 24 Superior colliculus
- 25 Cerebral aqueduct
- 26 Red nucleus
- 27 Substantia nigra
- 28 Cerebral peduncle
- 29 Trochlear nerve (n. IV)
- 30 Gray matter
- 31 Nucleus of oculomotor nerve
- 32 Fibers of oculomotor nerve (n. III)
- 33 Vermis of cerebellum
- 34 Fourth ventricle
- 35 Reticular formation
- 36 Pons and transverse pontine fibers
- 37 Emboliform nucleus
- 38 Dentate nucleus
- 39 Middle cerebellar peduncle
- 40 Choroid plexus
- 41 Hypoglossal nucleus at rhomboid fossa
- 42 Medial longitudinal fasciculus
- 43 Trigeminal nerve (n. V.)
- 44 Inferior olivary nucleus
- 45 Corticospinal fibers and arcuate fibers
- 46 Fourth ventricle with choroid plexus
- 47 Vestibular nuclei
- 48 Nucleus and tractus solitarius
- 49 Inferior cerebellar peduncle (restiform body)
- 50 Reticular formation
- 51 Medial lemniscus
- 52 Cuneate nucleus of Burdach
- 53 Central canal
- 54 Pyramidal tract
- 55 Flocculus of cerebellum
- 56 Cerebellar hemisphere with pia mater
- 57 "Arbor vitae" of cerebellum
- 58 Nucleus gracilis of Goll
- 59 Lateral recess of choroid plexus of fourth ventricle
- 60 Posterior inferior cerebellar artery
- 61 Choroid plexus of lateral ventricle

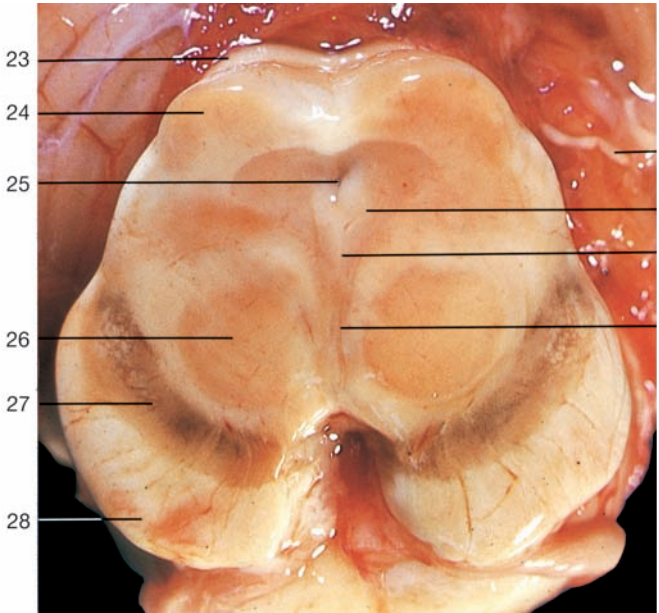


Coronal section through the brain at the level of the third ventricle and the interthalamic adhesion. Section 2.

- 10 Lateral ventricle
- 11 Septum pellucidum
- 12 Lobus insularis (insula)
- 13 External capsule
- 14 Column of fornix
- 15 Optic recess
- 16 Infundibulum
- 17 Thalamus
- 18 Claustrum
- 19 Lenticular ansa
- 20 Third ventricle and hypothalamus
- 21 Basilar artery and pons
- 22 Cortex of temporal lobe
- 23 Inferior colliculus
- 24 Superior colliculus
- 25 Cerebral aqueduct
- 26 Red nucleus
- 27 Substantia nigra
- 28 Cerebral peduncle
- 29 Trochlear nerve (n. IV)
- 30 Gray matter
- 31 Nucleus of oculomotor nerve
- 32 Fibers of oculomotor nerve (n. III)
- 33 Vermis of cerebellum
- 34 Fourth ventricle
- 35 Reticular formation
- 36 Pons and transverse pontine fibers
- 37 Emboliform nucleus
- 38 Dentate nucleus
- 39 Middle cerebellar peduncle
- 40 Choroid plexus
- 41 Hypoglossal nucleus at rhomboid fossa
- 42 Medial longitudinal fasciculus
- 43 Trigeminal nerve (n. V.)
- 44 Inferior olivary nucleus
- 45 Corticospinal fibers and arcuate fibers
- 46 Fourth ventricle with choroid plexus
- 47 Vestibular nuclei
- 48 Nucleus and tractus solitarius
- 49 Inferior cerebellar peduncle (restiform body)
- 50 Reticular formation
- 51 Medial lemniscus
- 52 Cuneate nucleus of Burdach
- 53 Central canal
- 54 Pyramidal tract
- 55 Flocculus of cerebellum
- 56 Cerebellar hemisphere with pia mater
- 57 "Arbor vitae" of cerebellum
- 58 Nucleus gracilis of Goll
- 59 Lateral recess of choroid plexus of fourth ventricle
- 60 Posterior inferior cerebellar artery
- 61 Choroid plexus of lateral ventricle



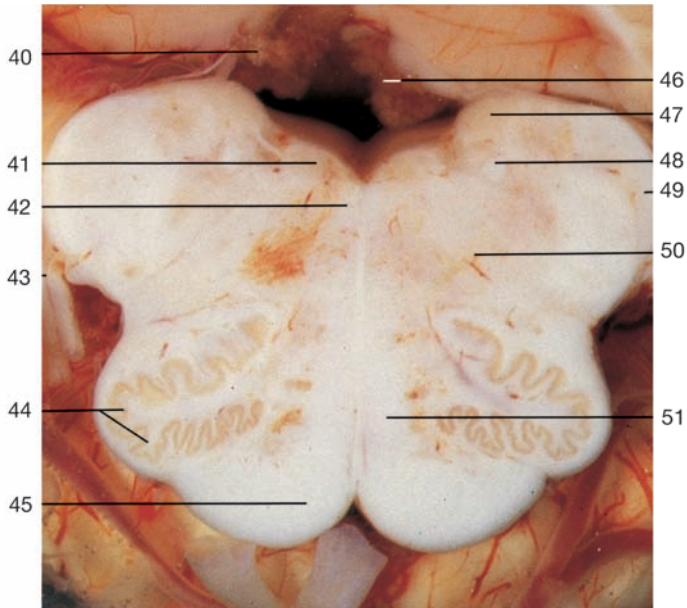
Coronal section through the brain at the level of the inferior colliculus (posterior aspect). Section 3.



Cross section through the midbrain (mesencephalon) at the level of the superior colliculus (superior aspect). Section 4.



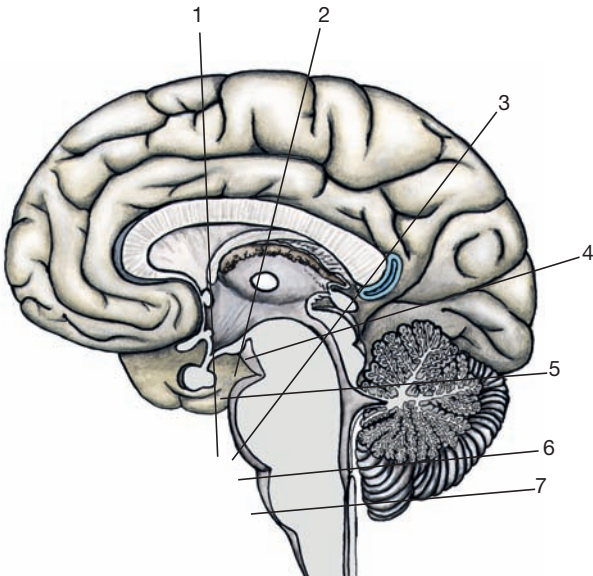
Cross section through the rhombencephalon at the level of the pons (inferior aspect). Section 5.



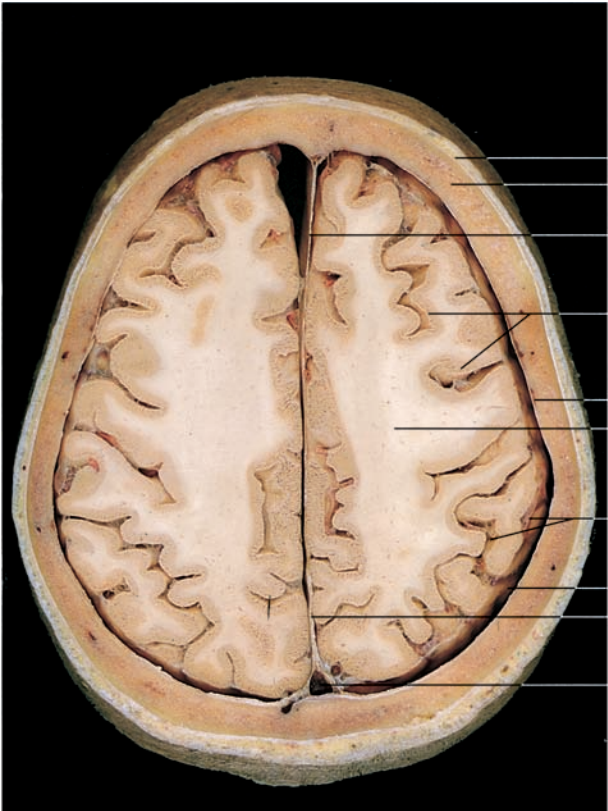
Cross section through the rhombencephalon at the level of the olive (inferior aspect). Section 6.



Cross section through medulla oblongata and cerebellum (inferior aspect). Section 7.

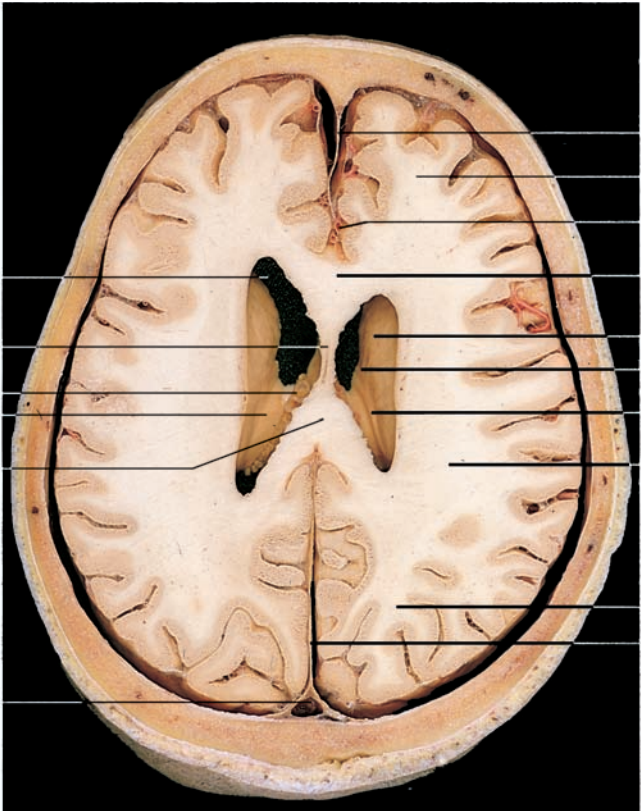


Right half of the brain. Levels of the sections are indicated.



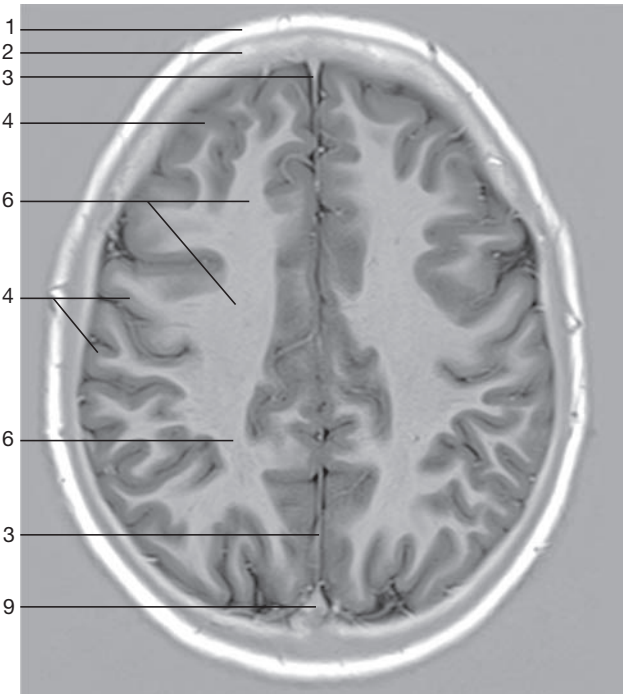
Horizontal section through the head and brain.
Section 1.

- | | |
|----------------------------------|--|
| 1 Skin of scalp | 7 Arachnoid and pia mater with vessels |
| 2 Calvaria (diploe of the skull) | 8 Subdural space (slightly expanded due to shrinkage of the brain) |
| 3 Falx cerebri | 9 Superior sagittal sinus |
| 4 Gray matter of brain (cortex) | |
| 5 Dura mater | |
| 6 White matter of brain | |

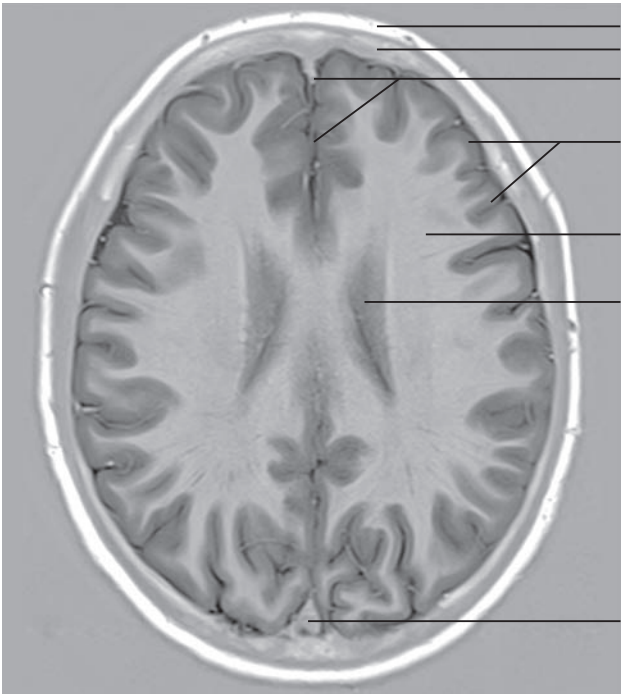


Horizontal section through the head and brain.
Section 2.

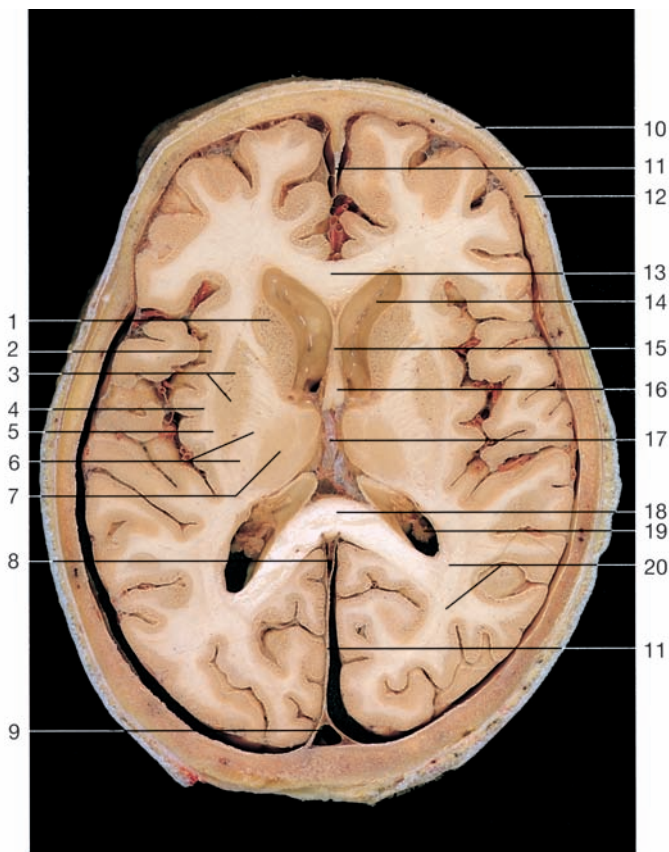
- | | |
|--------------------------------|--------------------------------------|
| 11 Septum pellucidum | 17 Anterior cerebral artery |
| 12 Choroid plexus | 18 Genu of corpus callosum |
| 13 Thalamus | 19 Caudate nucleus |
| 14 Splenium of corpus callosum | 20 Central part of lateral ventricle |
| 15 Parietal lobe | 21 Stria terminalis |
| 16 Frontal lobe | 22 Occipital lobe |



Horizontal section through the head and brain at the level of section 1 (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

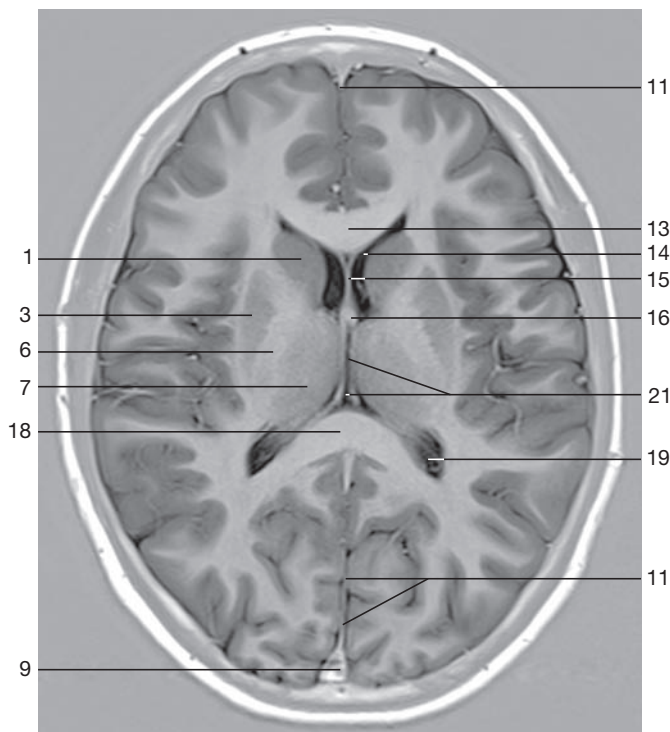


Horizontal section through the head and brain at the level of section 2 (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

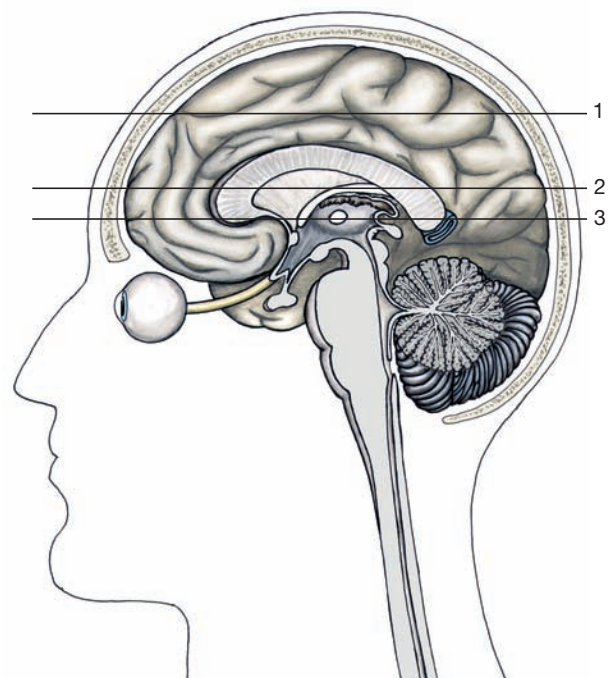


- 1 Caudate nucleus
- 2 Lobus insularis (insula)
- 3 Putamen
- 4 Claustrum
- 5 External capsule
- 6 Internal capsule
- 7 Thalamus
- 8 Inferior sagittal sinus
- 9 Superior sagittal sinus
- 10 Skin of scalp
- 11 Falx cerebri
- 12 Calvaria (diploe of the skull)
- 13 Genu of corpus callosum
- 14 Anterior horn of lateral ventricle
- 15 Septum pellucidum
- 16 Column of fornix
- 17 Choroid plexus of third ventricle
- 18 Splenium of corpus callosum
- 19 Entrance to inferior horn of lateral ventricle with choroid plexus
- 20 Optic radiation
- 21 Third ventricle

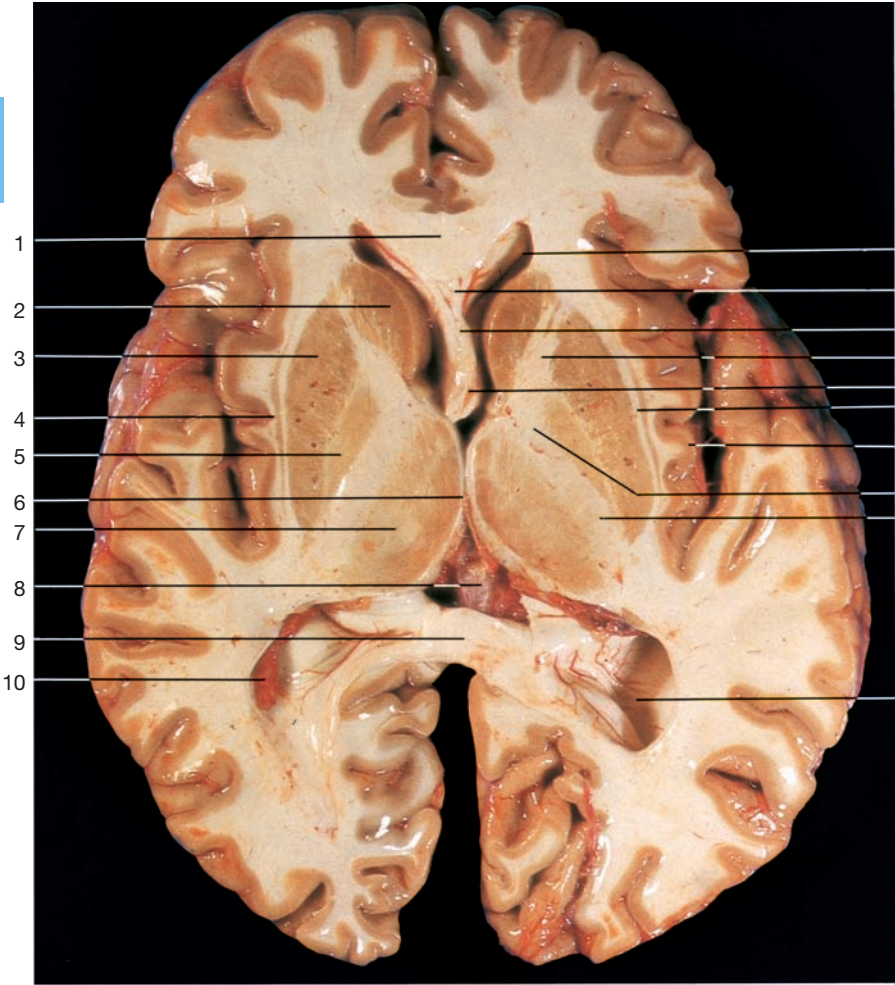
Horizontal section through the head and brain at the level of third ventricle of internal capsule and neighboring nuclei.
Section 3.



Horizontal section through the head and brain at the level of section 3 (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

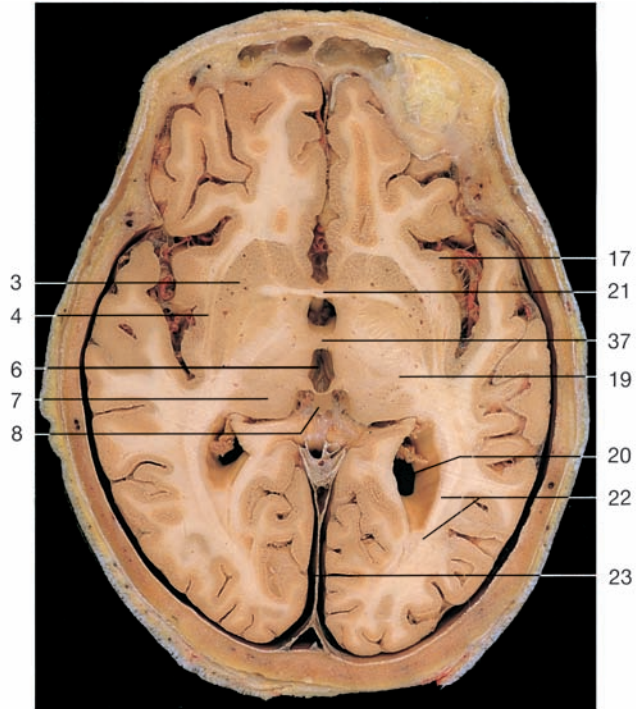


Sagittal section through the head and brain.
Levels of the sections are indicated.

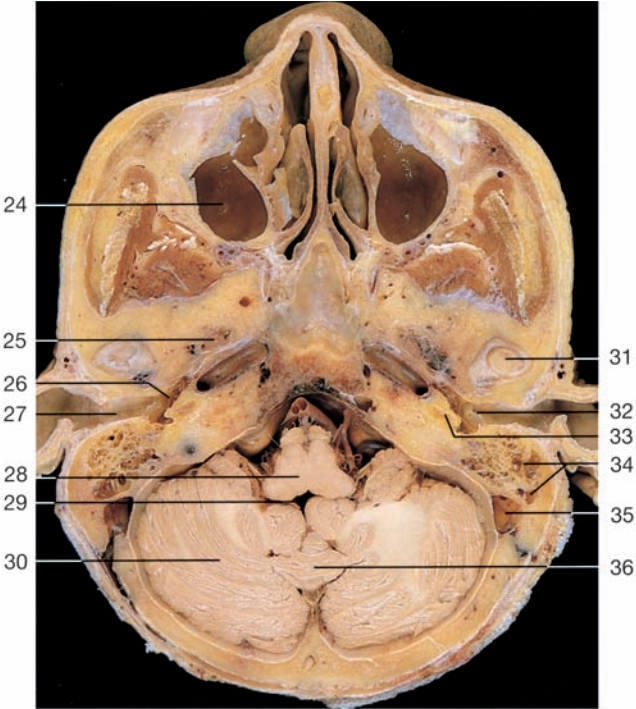


Horizontal section through the brain, showing the subcortical nuclei and internal capsule. Section 1.

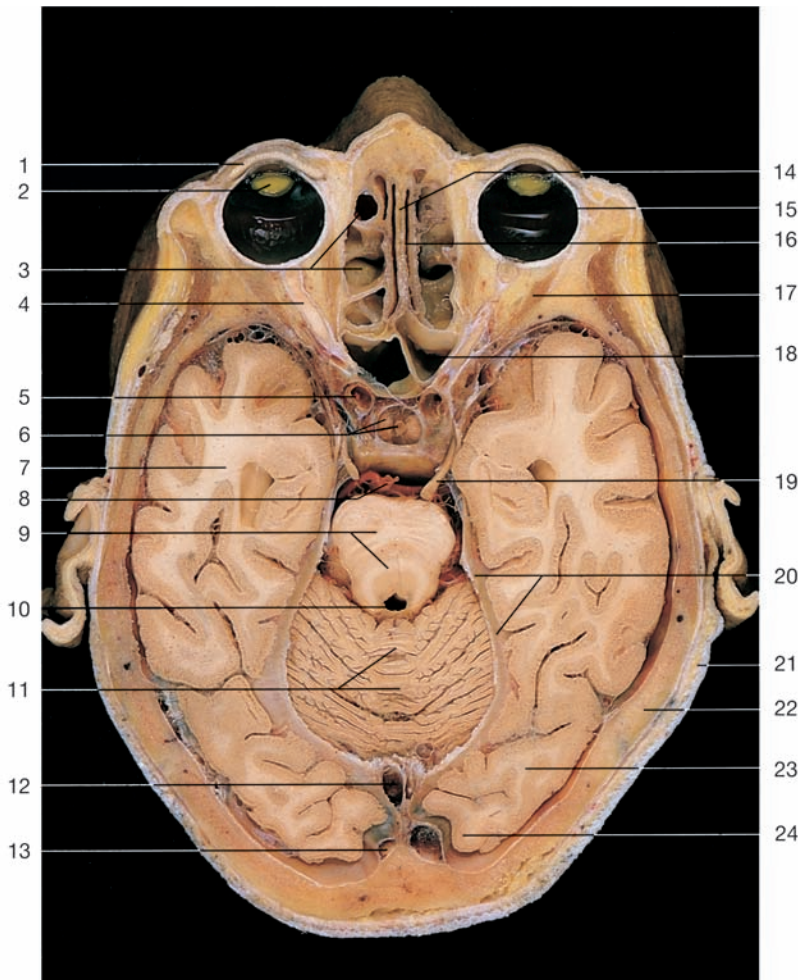
- 1 Genu of corpus callosum
- 2 Head of caudate nucleus
- 3 Putamen
- 4 Claustrum
- 5 Globus pallidus
- 6 Third ventricle
- 7 Thalamus
- 8 Pineal body
- 9 Splenium of corpus callosum
- 10 Choroid plexus of the lateral ventricle
- 11 Anterior horn of lateral ventricle
- 12 Cavity of septum pellucidum
- 13 Septum pellucidum
- 14 Anterior limb of internal capsule
- 15 Column of fornix
- 16 External capsule
- 17 Lobus insularis (insula)
- 18 Genu of internal capsule
- 19 Posterior limb of internal capsule
- 20 Posterior horn of lateral ventricle
- 21 Anterior commissure
- 22 Optic radiation
- 23 Falx cerebri
- 24 Maxillary sinus
- 25 Position of auditory tube
- 26 Tympanic cavity
- 27 External acoustic meatus
- 28 Medulla oblongata
- 29 Fourth ventricle
- 30 Cerebellum (left hemisphere)
- 31 Temporomandibular joint
- 32 Tympanic membrane
- 33 Base of cochlea
- 34 Mastoid air cells
- 35 Sigmoid sinus
- 36 Vermis of cerebellum
- 37 Intermediate mass



Horizontal section through the head and brain. Section 2.

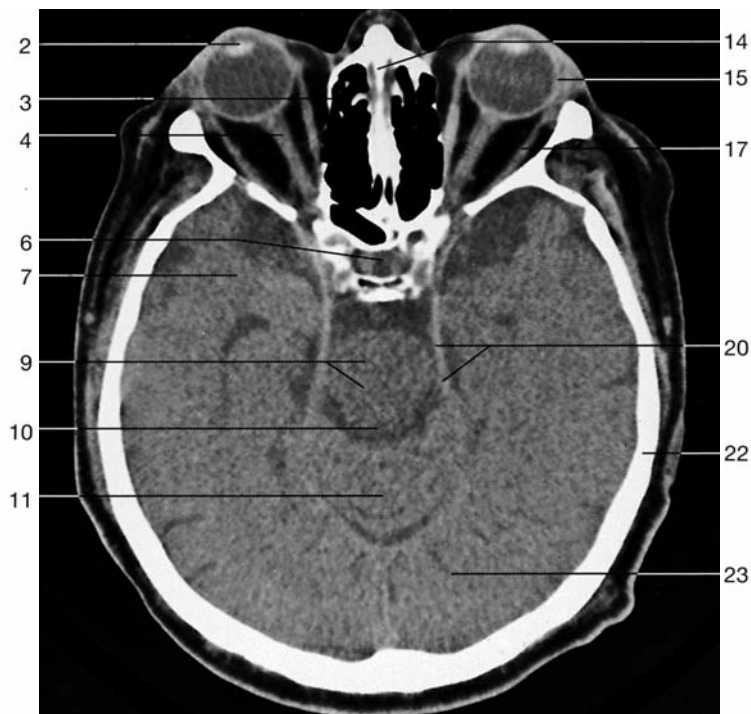


Horizontal section through the head and brain. Section 4.

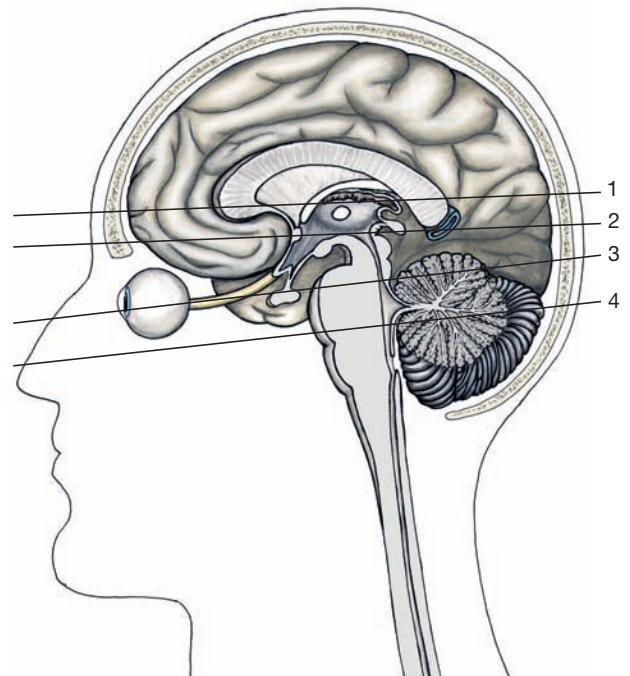


- 1 Upper lid (tarsal plate)
- 2 Lens
- 3 Ethmoidal sinus
- 4 Optic nerve (n. II)
- 5 Internal carotid artery
- 6 Infundibulum and pituitary gland
- 7 Temporal lobe
- 8 Basilar artery
- 9 Pons (cross section of brain stem)
- 10 Cerebral aqueduct (beginning of fourth ventricle)
- 11 Vermis of cerebellum
- 12 Straight sinus
- 13 Transverse sinus
- 14 Nasal septum
- 15 Eyeball (sclera)
- 16 Nasal cavity
- 17 Lateral rectus muscle
- 18 Sphenoidal sinus
- 19 Oculomotor nerve (n. III)
- 20 Cerebellar tentorium
- 21 Skin of scalp
- 22 Calvaria (diploe of the skull)
- 23 Occipital lobe
- 24 Striate cortex (visual cortex)

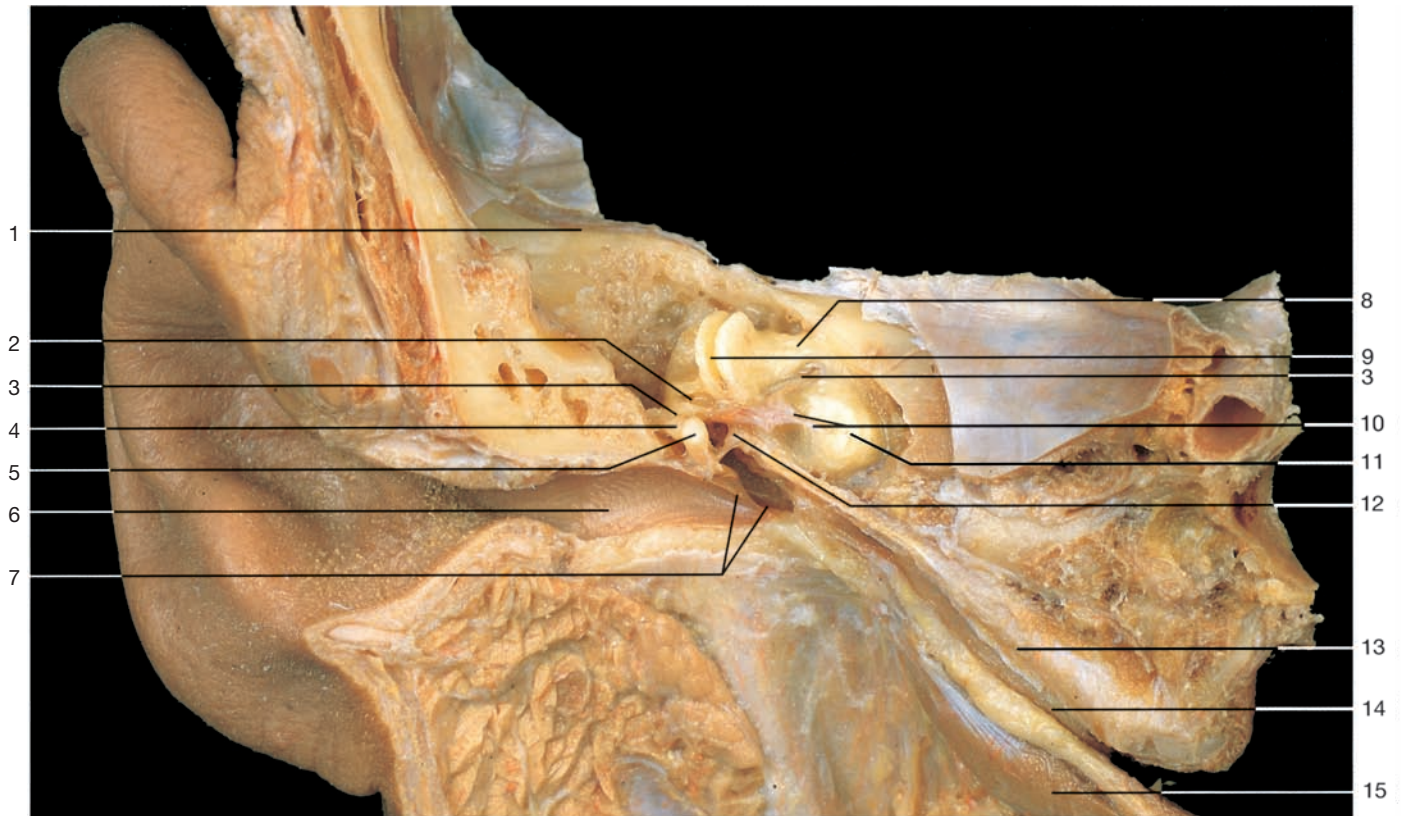
Horizontal section through the head and brain. Section 3.



Horizontal section through the head and brain at the level of section 3 (CT scan).

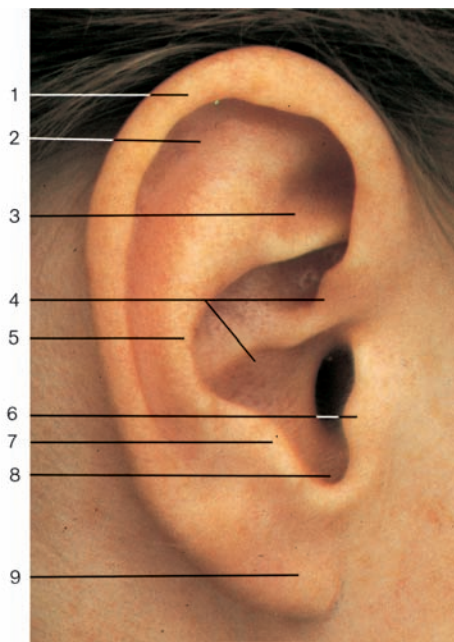


Sagittal section through the head and brain.
Levels of the sections are indicated.



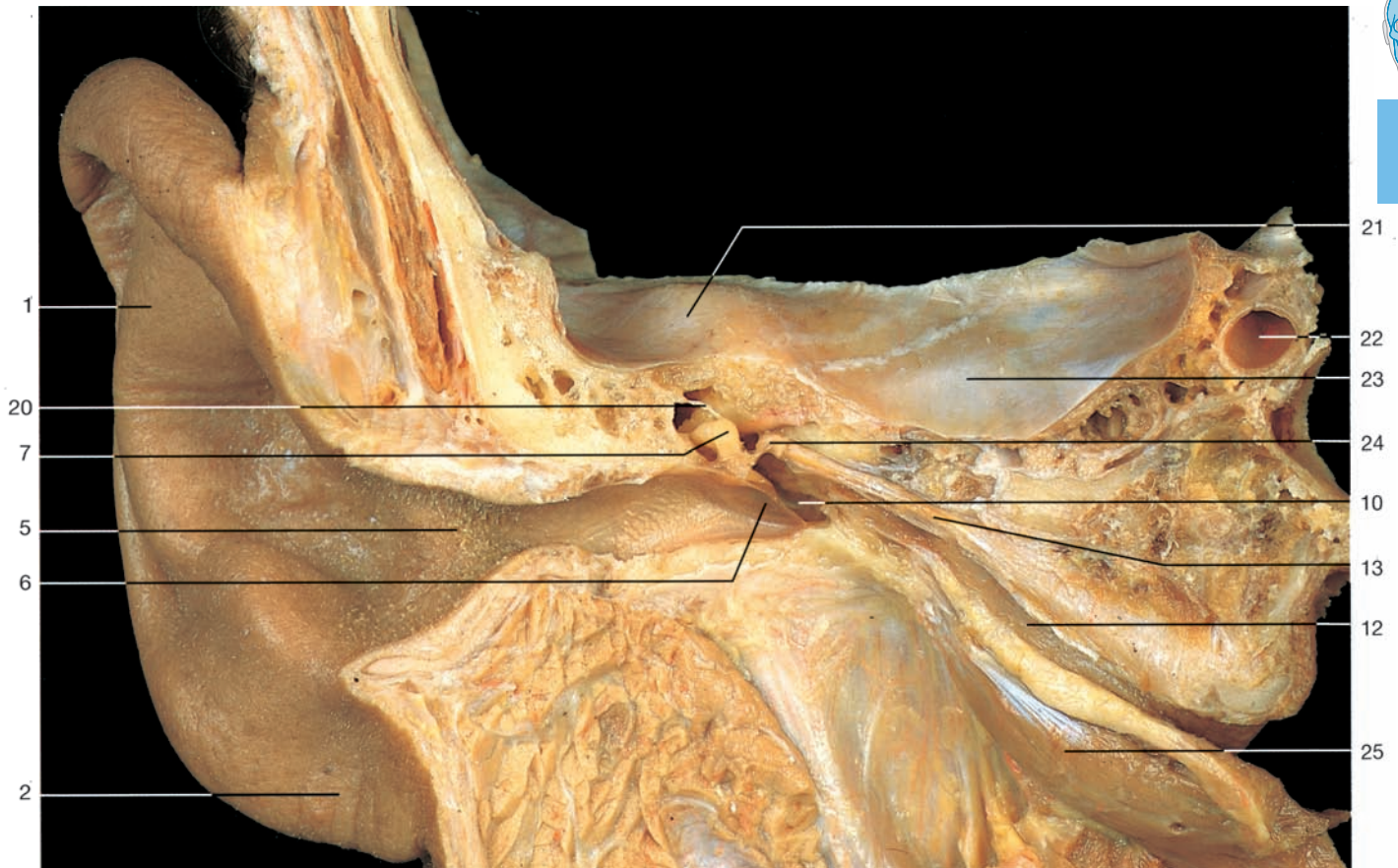
Longitudinal section through the right outer, middle, and inner ear (anterior aspect). The cochlea and semicircular canals have been further dissected.

- | | | |
|--------------------------------------|---|---------------------------------|
| 1 Roof of tympanic cavity | 6 External acoustic meatus | 11 Cochlea |
| 2 Lateral osseous semicircular canal | 7 Tympanic cavity and tympanic membrane | 12 Stapes |
| 3 Facial nerve | 8 Vestibulocochlear nerve | 13 Tensor tympani muscle |
| 4 Incus | 9 Anterior osseous semicircular canal | 14 Auditory tube |
| 5 Malleus | 10 Geniculate ganglion and greater petrosal nerve | 15 Levator veli palatini muscle |



- 1 Helix
- 2 Scaphoid fossa
- 3 Triangular fossa
- 4 Concha
- 5 Antihelix
- 6 Tragus
- 7 Antitragus
- 8 Intertragic notch
- 9 Lobule

Right auricle (lateral aspect).



Longitudinal section through the right outer, middle, and inner ear (anterior aspect).

Outer ear

- 1 Auricle
- 2 Lobule of auricle
- 3 Helix
- 4 Tragus
- 5 External acoustic meatus

Middle ear

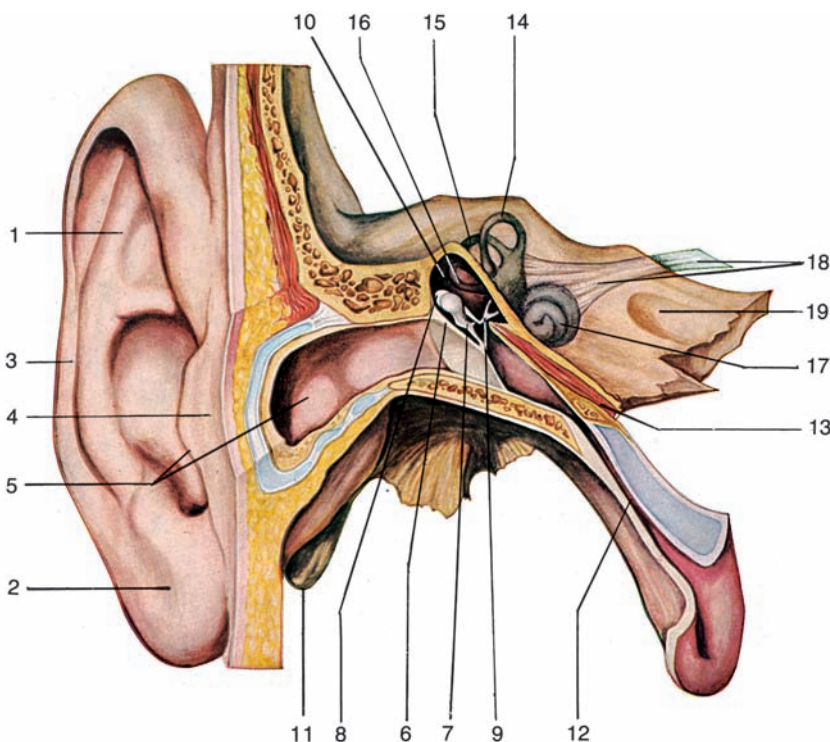
- 6 Tympanic membrane
- 7 Malleus
- 8 Incus
- 9 Stapes
- 10 Tympanic cavity
- 11 Mastoid process
- 12 Auditory tube
- 13 Tensor tympani muscle

Inner ear

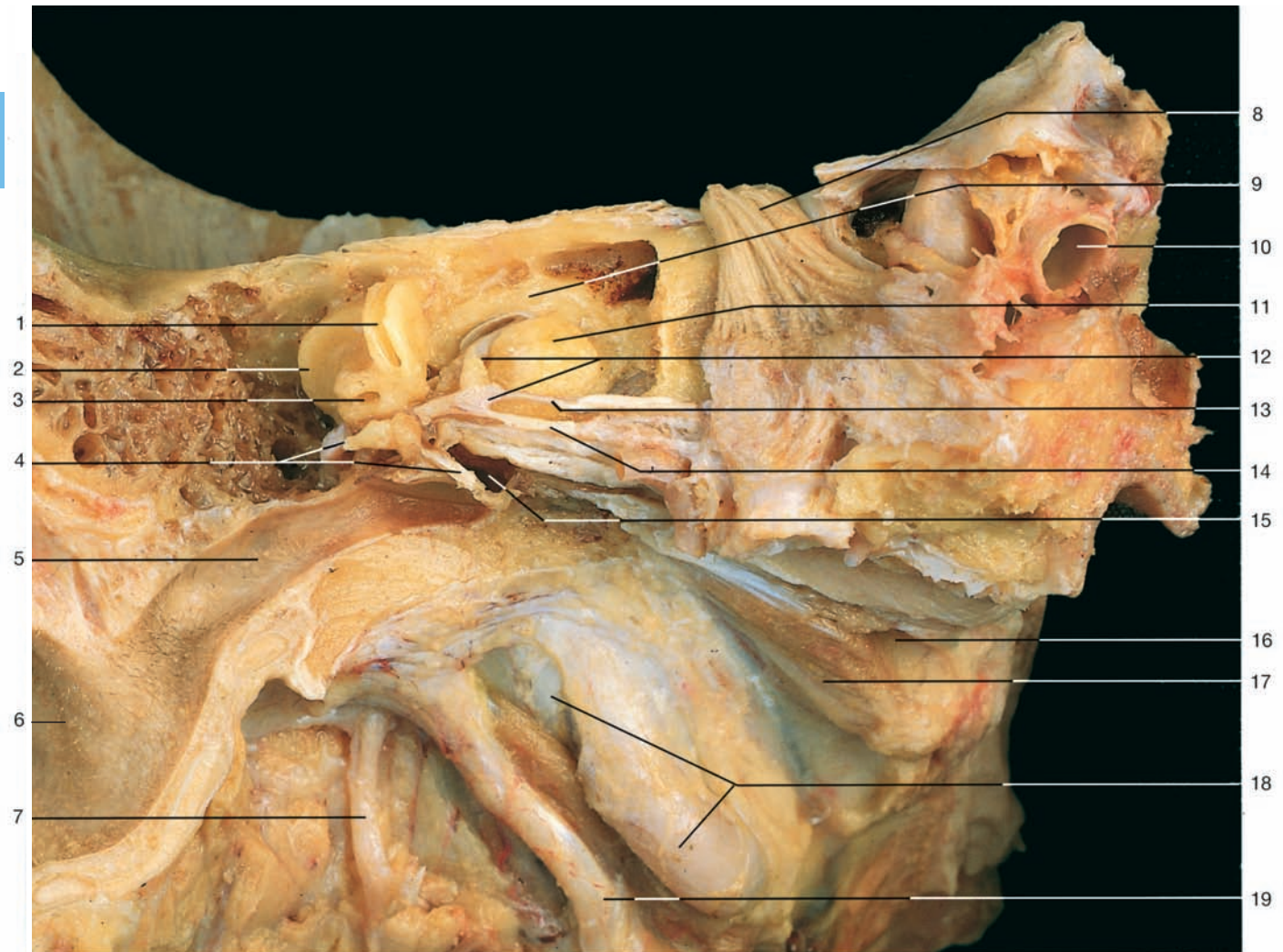
- 14 Anterior semicircular duct
- 15 Posterior semicircular duct
- 16 Lateral semicircular duct
- 17 Cochlea
- 18 Vestibulocochlear nerve (n. VIII)
- 19 Petrous part of the temporal bone

Additional structures

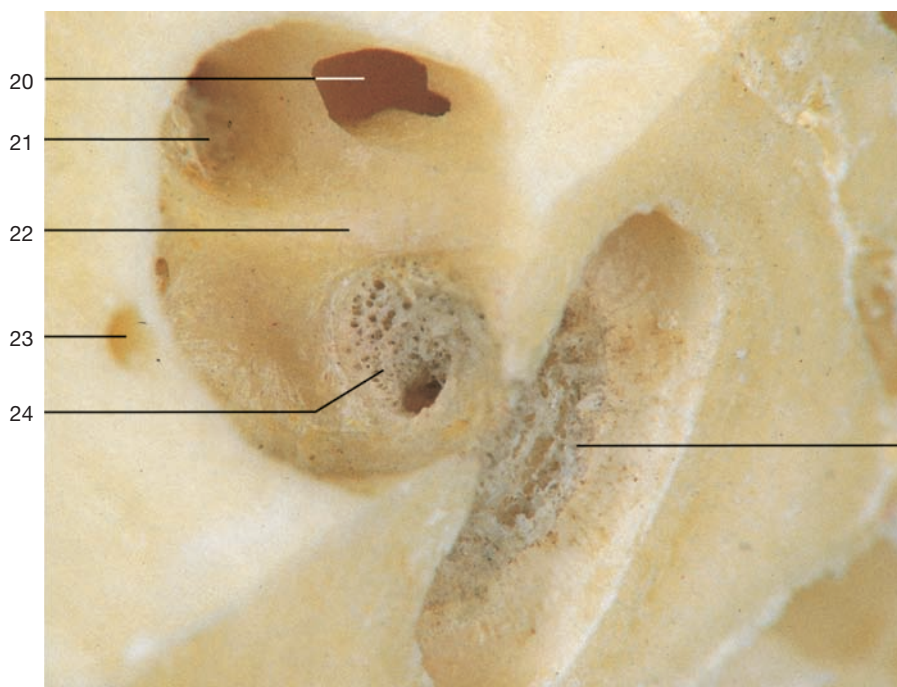
- 20 Superior ligament of malleus
- 21 Arcuate eminence
- 22 Internal carotid artery
- 23 Anterior surface of pyramid with dura mater
- 24 Stapes
- 25 Levator veli palatini muscle



Right auditory and vestibular apparatus (anterior aspect).

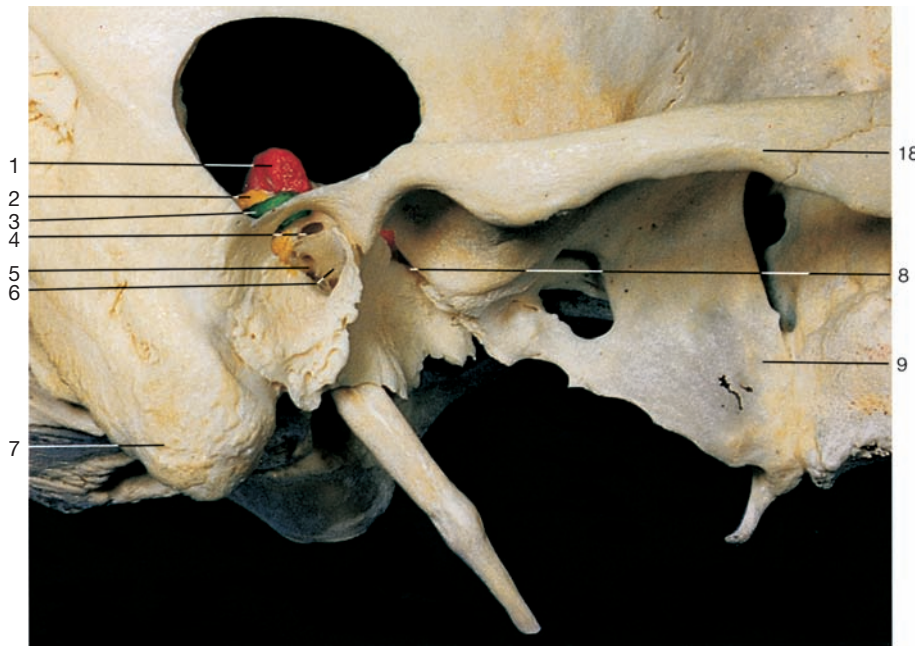


Longitudinal section through the outer, middle, and inner ear (anterior aspect). Deeper dissection to display facial nerve and lesser and greater petrosal nerves.



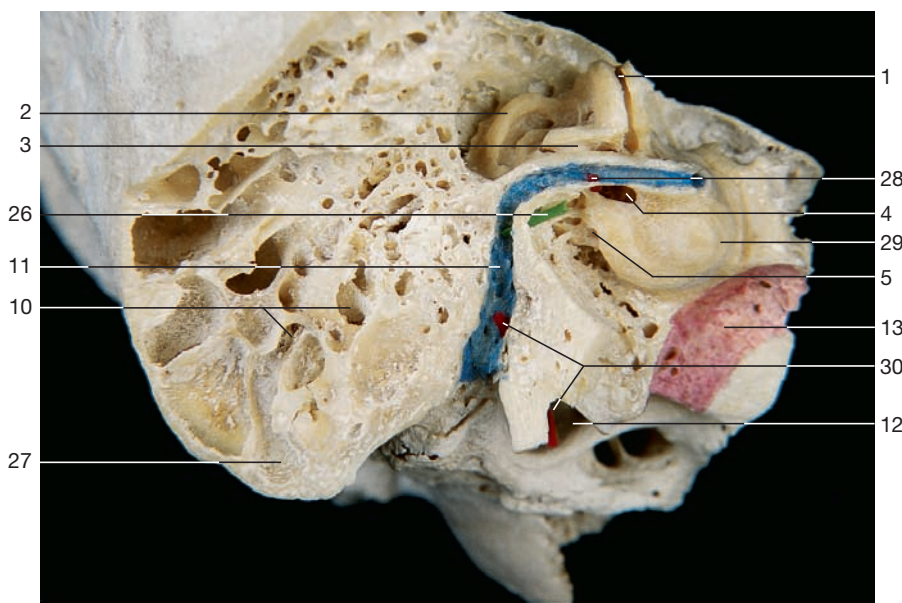
Internal acoustic meatus, left side. The bone was partly removed to show the bottom of the meatus.

- 1 Anterior osseous semicircular canal (opened)
- 2 Posterior osseous semicircular canal
- 3 Lateral osseous semicircular canal (opened)
- 4 Facial nerve and chorda tympani
- 5 External acoustic meatus
- 6 Auricle
- 7 Facial nerve
- 8 Trigeminal nerve
- 9 Bony base of internal acoustic meatus
- 10 Internal carotid artery within cavernous sinus
- 11 Cochlea
- 12 Facial nerve with geniculate ganglion
- 13 Greater petrosal nerve
- 14 Lesser petrosal nerve
- 15 Tympanic cavity
- 16 Auditory tube
- 17 Levator veli palatini muscle
- 18 Internal carotid artery and internal jugular vein
- 19 Styloid process
- 20 Area of facial nerve
- 21 Superior vestibular area
- 22 Transverse crest
- 23 Foramen singulare
- 24 Foraminous spiral tract (outlet of cochlear part of vestibulocochlear nerve)
- 25 Base of cochlea



- 1 Anterior semicircular canal (red)
- 2 Posterior semicircular canal (yellow)
- 3 Lateral or horizontal semicircular canal (green)
- 4 Fenestra vestibuli
- 5 Fenestra cochleae
- 6 Tympanic cavity
- 7 Mastoid process
- 8 Petrotympanic fissure (red probe: chorda tympani)
- 9 Lateral pterygoid plate
- 10 Mastoid air cells
- 11 Facial canal (blue)
- 12 Foramen ovale
- 13 Carotid canal (red)
- 14 Tympanic ring
- 15 Petromastoid part of temporal bone
- 16 Squamous part of temporal bone
- 17 Squamomastoid suture
- 18 Zygomatic process of temporal bone
- 19 Incisure of tympanic ring
- 20 Promontory
- 21 Apex of cochlea (cupula)
- 22 Spiral canal of cochlea at base of cochlea
- 23 Epitympanic recess
- 24 Auditory ossicles and tympanic cavity
- 25 Hypotympanic recess
- 26 Canaliculus chordae tympani (green probe)
- 27 Mastoid process
- 28 Canaliculus for stapedius nerve (red)
- 29 Cochlea
- 30 Canaliculus mastoideus (red probe)

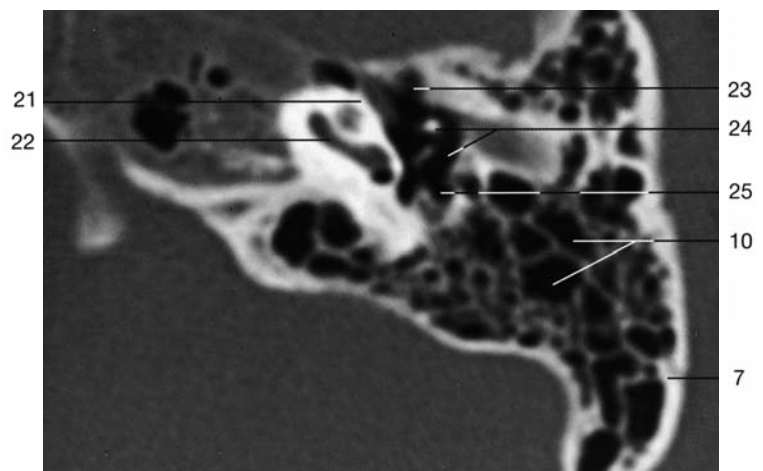
Right temporal bone (lateral aspect). Petrosquamous portion has been partly removed to display the semicircular canals.



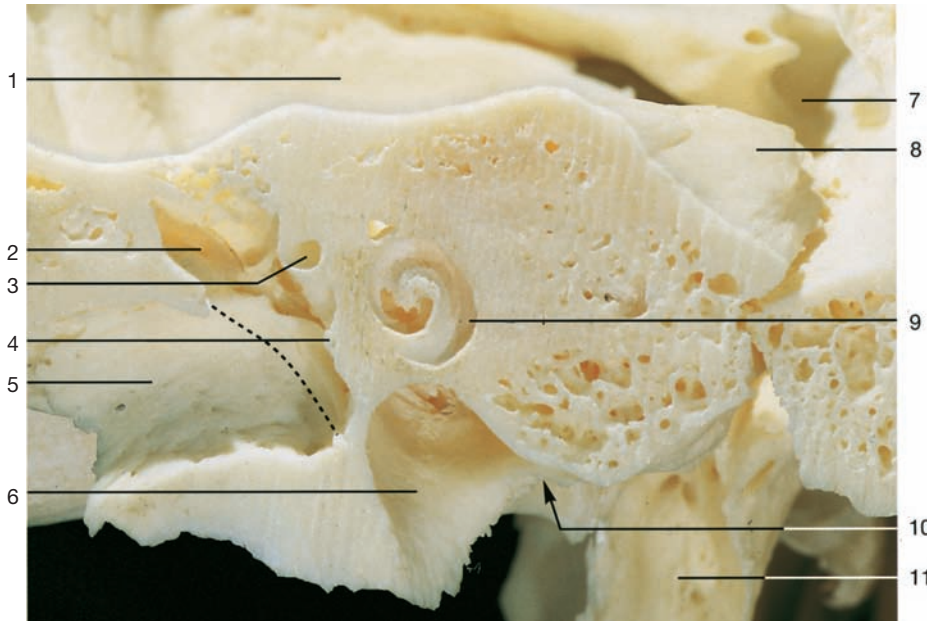
Right temporal bone (lateral aspect). Mastoid air cells and facial canal had been opened. The three semicircular canals were dissected.



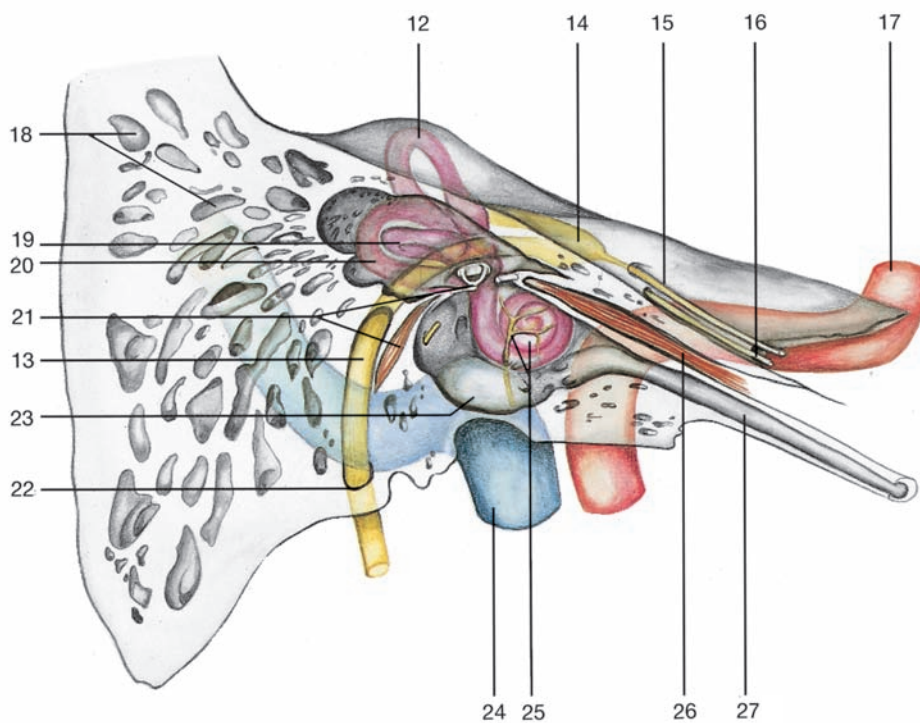
Right temporal bone of the newborn (lateral aspect).



Frontal section through the petrous part of temporal bone (CT scan).



Frontal section through the petrous part of the left temporal bone at the level of the cochlea (posterior aspect). The position of the tympanic membrane is indicated by a dotted line.

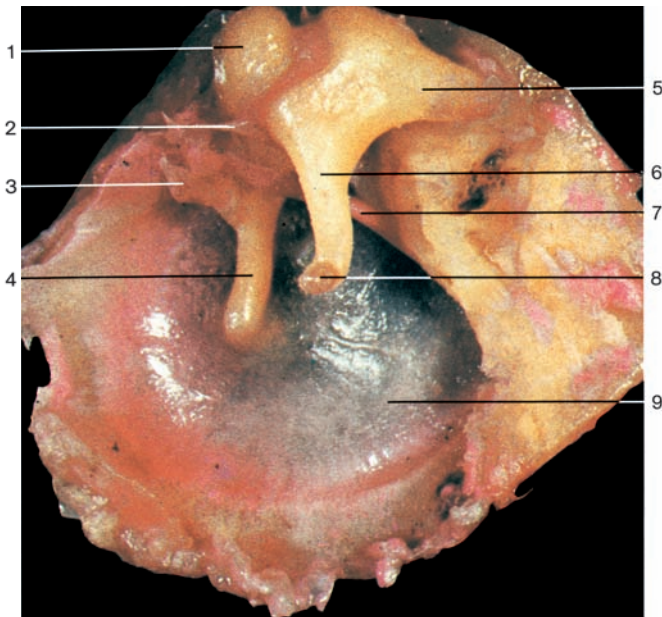


Medial wall of the tympanic cavity and its relation to neighboring structures of the inner ear, facial nerve, and blood vessels. Frontal section through the right temporal bone (anterior aspect).

- 1 Anterior surface of the pyramid
- 2 Mastoid antrum
- 3 Lateral semicircular canal
- 4 Cochleariform process
- 5 External acoustic meatus
- 6 Jugular fossa
- 7 Foramen lacerum
- 8 Apex of petrous part
- 9 Position of cochlea (modiolus with crista spiralis ossea)

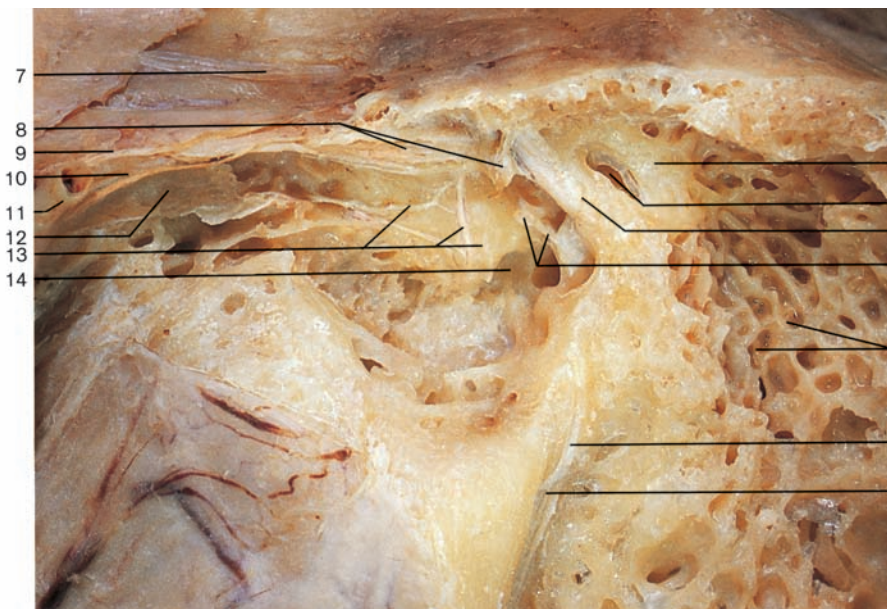
- 10 Carotid canal
- 11 Pterygoid process
- 12 Anterior semicircular duct
- 13 Facial nerve
- 14 Geniculate ganglion
- 15 Greater petrosal nerve
- 16 Lesser petrosal nerve
- 17 Internal carotid artery
- 18 Mastoid air cells
- 19 Lateral semicircular duct

- 20 Posterior semicircular duct
- 21 Stapes with stapedius muscle
- 22 Stylomastoid foramen
- 23 Inferior recess of tympanic cavity (hypotympanon)
- 24 Internal jugular vein
- 25 Promontory with tympanic plexus (position of cochlea)
- 26 Tensor muscle of tympanum
- 27 Auditory tube



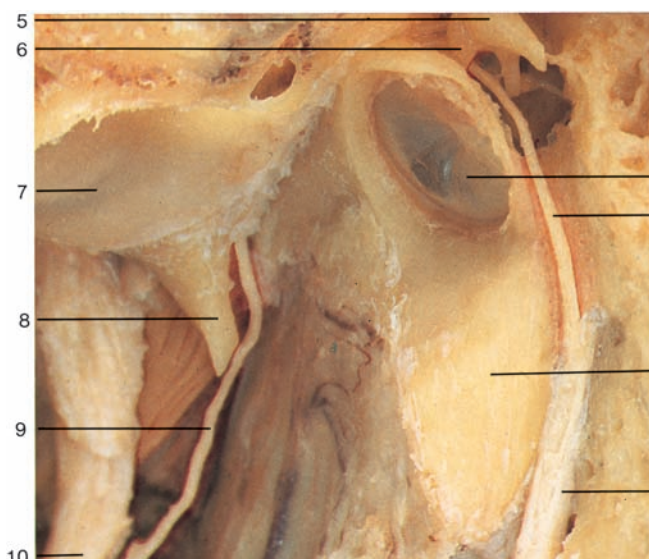
- 1 Head of malleus
- 2 Anterior ligament of malleus
- 3 Tendon of tensor tympani muscle
- 4 Handle of malleus
- 5 Short crus of incus
- 6 Long crus of incus
- 7 Chorda tympani
- 8 Lenticular process
- 9 Tympanic membrane

Tympanic membrane with malleus and incus (internal aspect, right side).



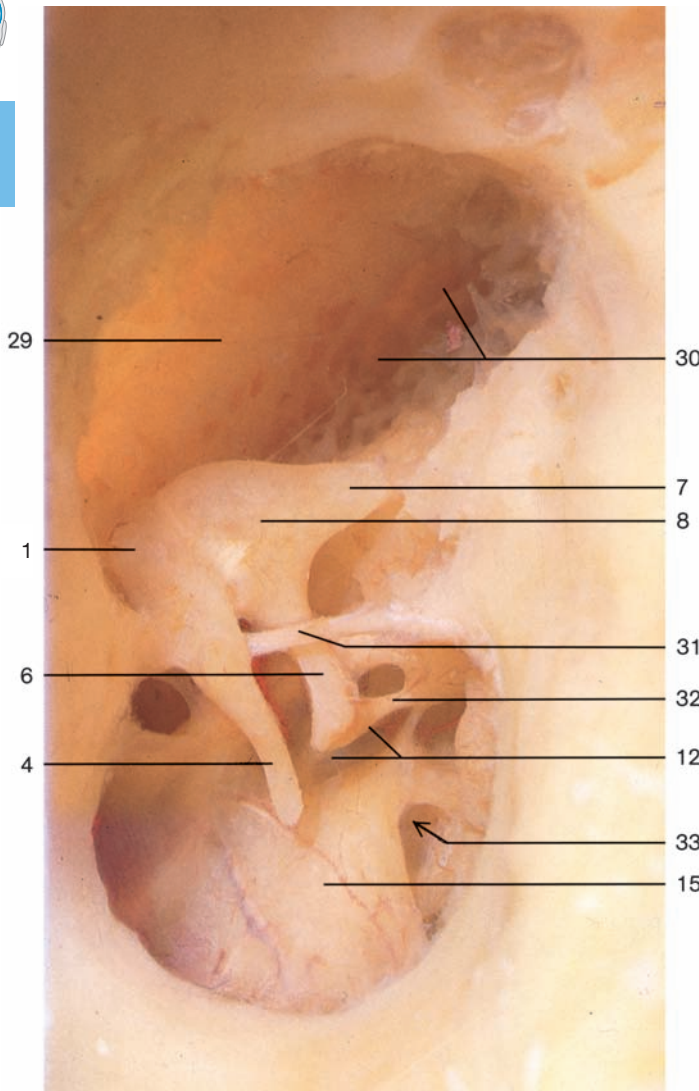
- 1 Tympanic antrum
- 2 Lateral semicircular canal (opened)
- 3 Facial canal
- 4 Stapes with tendon of stapedius
- 5 Mastoid air cells
- 6 Chorda tympani (intracranial part)
- 7 Greater petrosal nerve
- 8 Tensor tympani muscle (processus cochleariformis)
- 9 Lesser petrosal nerve
- 10 Anterior tympanic artery
- 11 Middle meningeal artery
- 12 Auditory tube
- 13 Promontory with tympanic plexus
- 14 Fenestra cochleae

Tympanic cavity, medial wall (left side). External acoustic meatus and lateral wall of tympanic cavity together with incus. Malleus and tympanic membrane have been removed; mastoid air cells are opened.

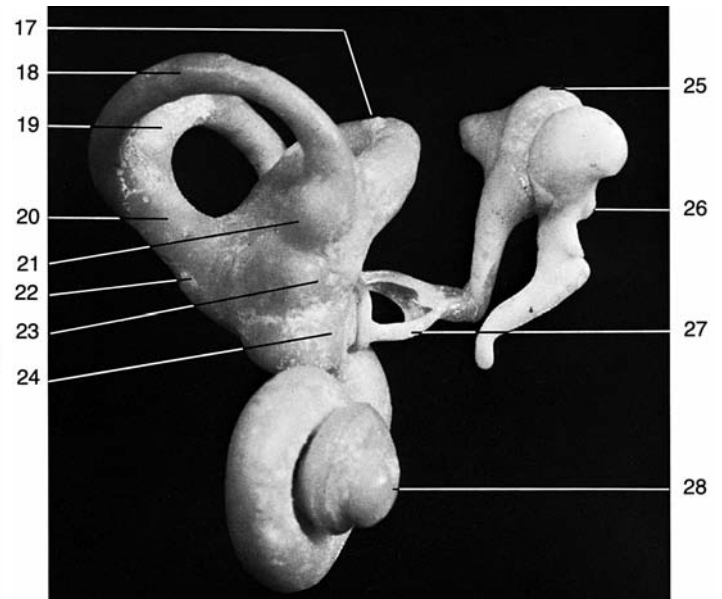


- 1 Tympanic membrane
- 2 Chorda tympani (intracranial part)
- 3 Floor of the external acoustic meatus
- 4 Facial nerve and facial canal
- 5 Incus
- 6 Head of malleus
- 7 Mandibular fossa
- 8 Spine of sphenoid
- 9 Chorda tympani (extracranial part)
- 10 Styloid process

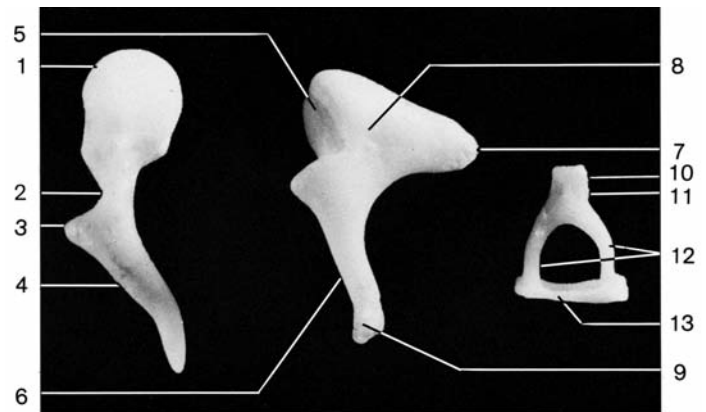
Tympanic membrane (lateral aspect, left side). External acoustic meatus and facial canal have been opened to expose the chorda tympani (magn. $\sim 1.5\times$).



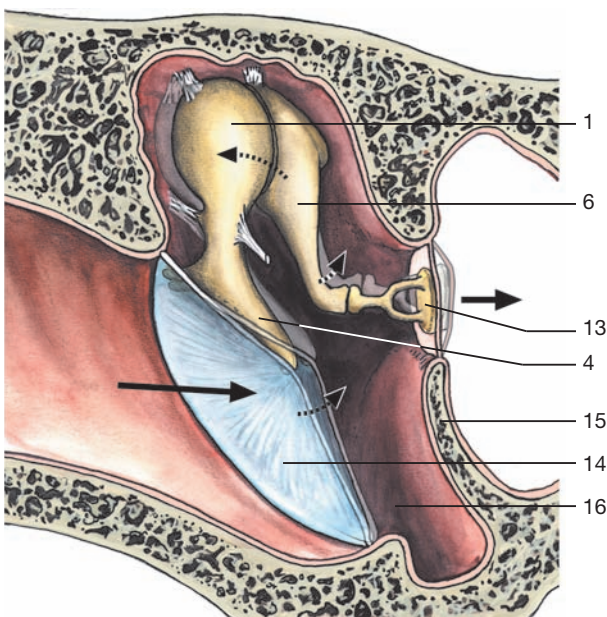
Tympanic cavity with malleus, incus, and stapes (lateral aspect, left side). Tympanic membrane removed, mastoid antrum opened.



Chain of auditory ossicles in connection with the inner ear (antero-lateral aspect, left side).



Auditory ossicles (isolated).



Position and movements of the auditory ossicles.

Malleus

- 1 Head
- 2 Neck
- 3 Lateral process
- 4 Handle

Incus

- 5 Articular facet for malleus
- 6 Long crus
- 7 Short crus
- 8 Body
- 9 Lenticular process

Stapes

- 10 Head
- 11 Neck
- 12 Anterior and posterior crura
- 13 Base

Walls of tympanic cavity

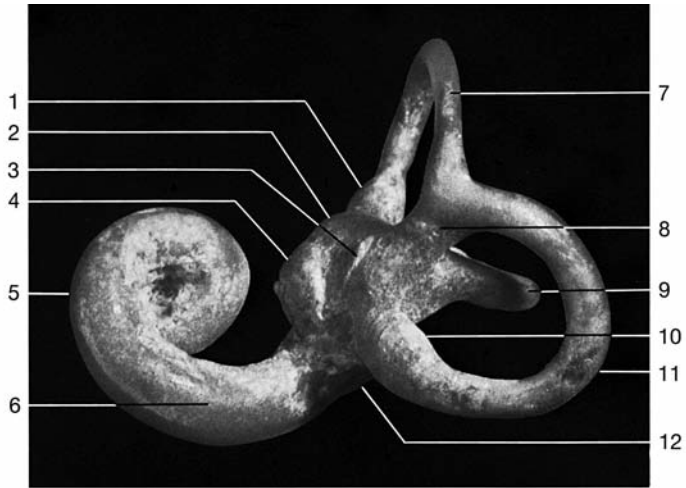
- 14 Tympanic membrane
- 15 Promontory
- 16 Hypotympanic recess of tympanic cavity

Internal ear (labyrinth)

- 17 Lateral semicircular duct
- 18 Anterior semicircular duct
- 19 Posterior semicircular duct
- 20 Common crus
- 21 Ampulla
- 22 Beginning of endolymphatic duct
- 23 Utricular prominence
- 24 Saccular prominence
- 25 Incus
- 26 Malleus
- 27 Stapes
- 28 Cochlea

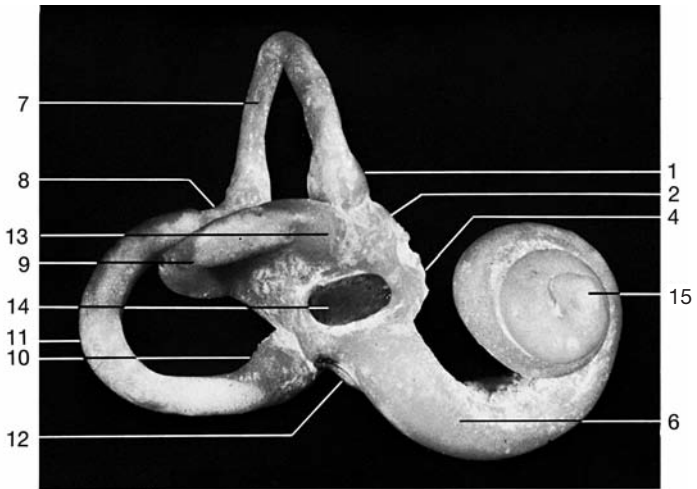
Tympanic cavity

- 29 Epitympanic recess
- 30 Mastoid antrum
- 31 Chorda tympani
- 32 Tendon of stapedius muscle
- 33 Round window (fenestra cochleae)



Cast of the right labyrinth (postero-medial aspect).

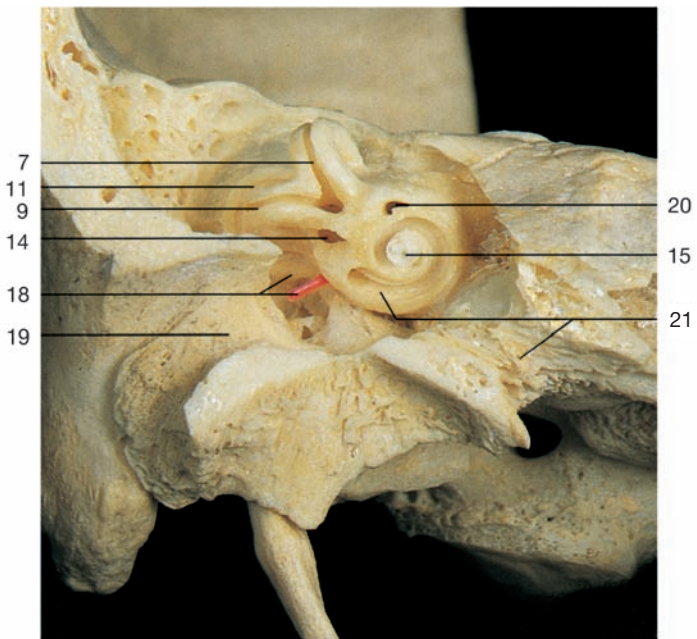
- | | |
|---|--|
| 1 Ampulla (anterior semicircular canal) | 16 External acoustic meatus |
| 2 Elliptical recess | 17 Mastoid air cells |
| 3 Aqueduct of the vestibule | 18 Tympanic cavity and fenestra cochleae (probe) |
| 4 Spherical recess | 19 External acoustic meatus |
| 5 Cochlea | 20 Facial canal |
| 6 Base of cochlea | 21 Base of cochlea and musculotubal canal |
| 7 Anterior semicircular canal | 22 Malleus and incus |
| 8 Crus commune or common limb | 23 Stapes |
| 9 Lateral semicircular canal | 24 Tympanic membrane |
| 10 Posterior bony ampulla | 25 Tympanic cavity |
| 11 Posterior semicircular canal (posterior canal) | 26 Aqueduct of cochlea |
| 12 Fenestra cochleae | 27 Endolymphatic sac |
| 13 Bony ampulla | 28 Endolymphatic duct |
| 14 Fenestra vestibuli | 29 Macula of utricle |
| 15 Cupula of cochlea | 30 Macula of saccule |



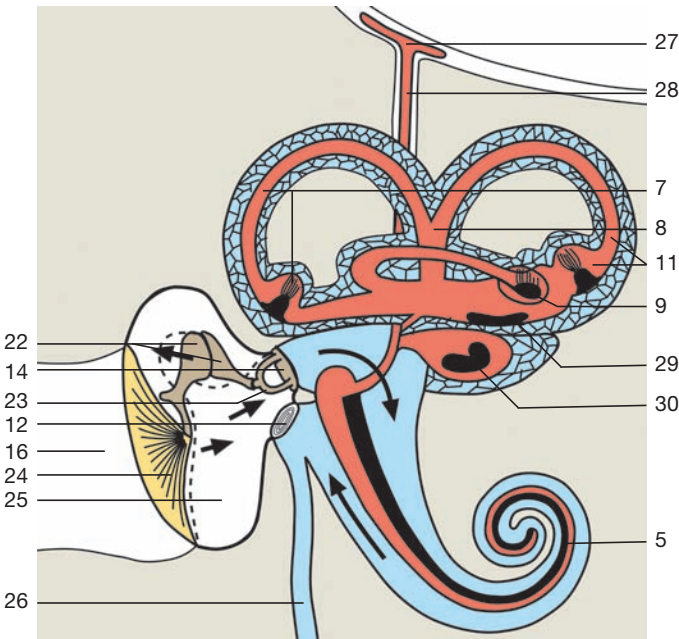
Cast of the right labyrinth (lateral aspect).



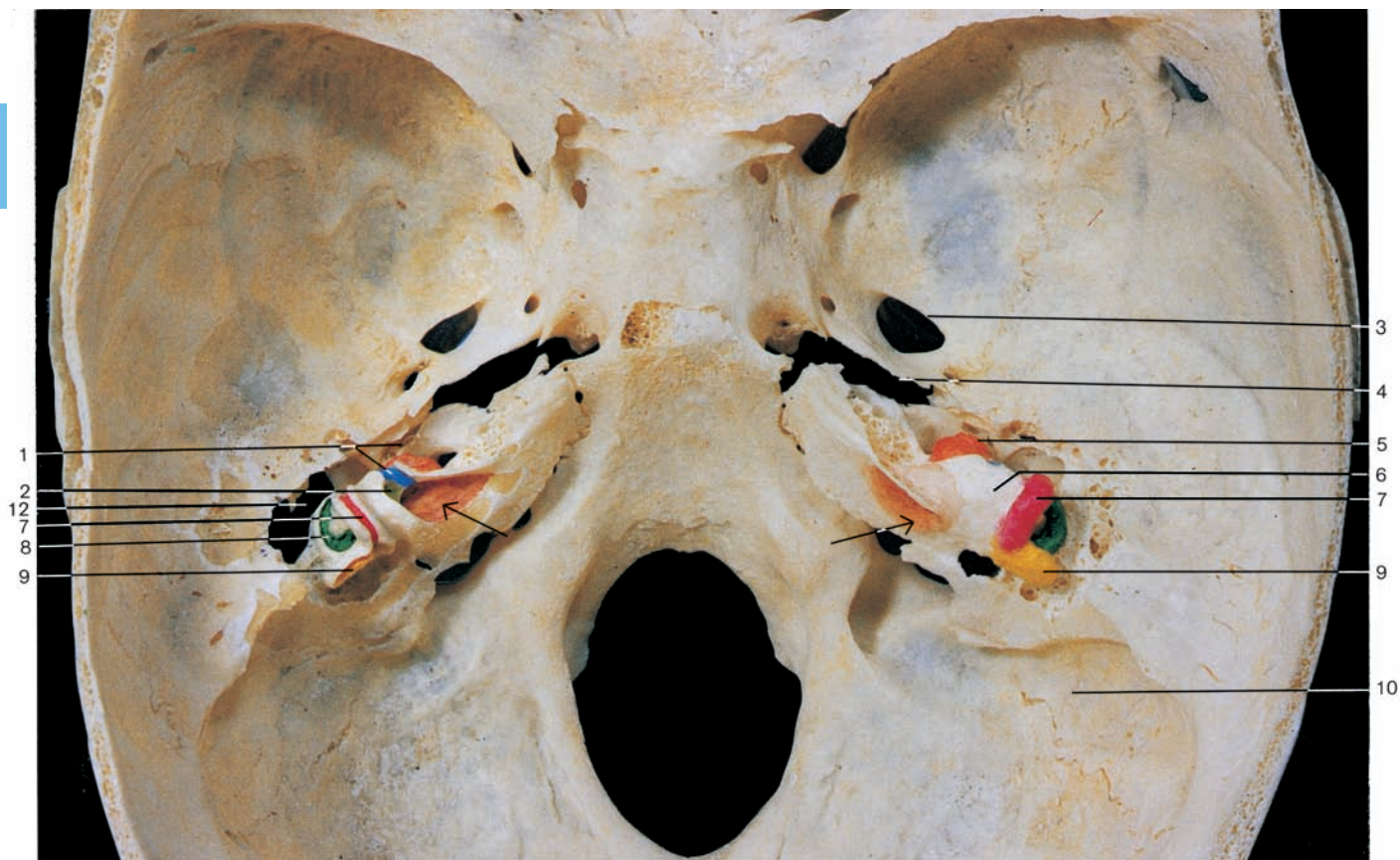
Cast of the labyrinth and mastoid cells (posterior aspect). Life size.



Dissection of bony labyrinth in situ. Semicircular canals and cochlear duct opened.

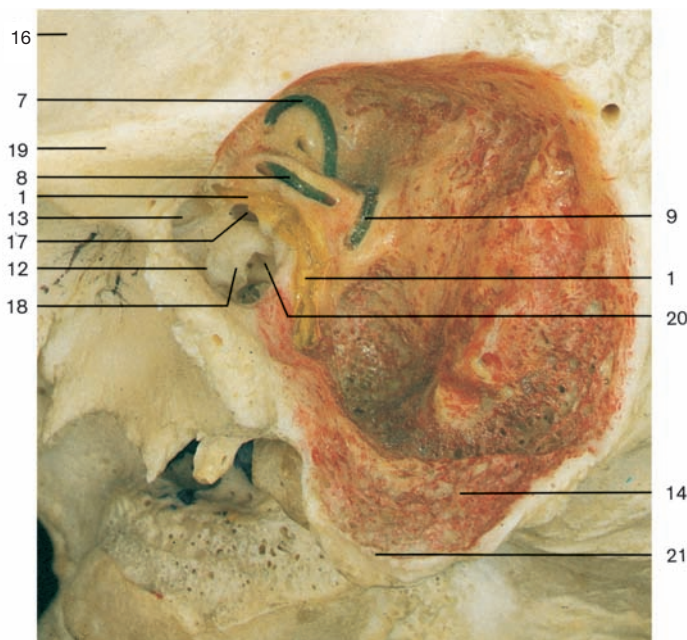


Auditory and vestibular apparatus. Arrows: direction of sound waves; blue = perilymphatic ducts.

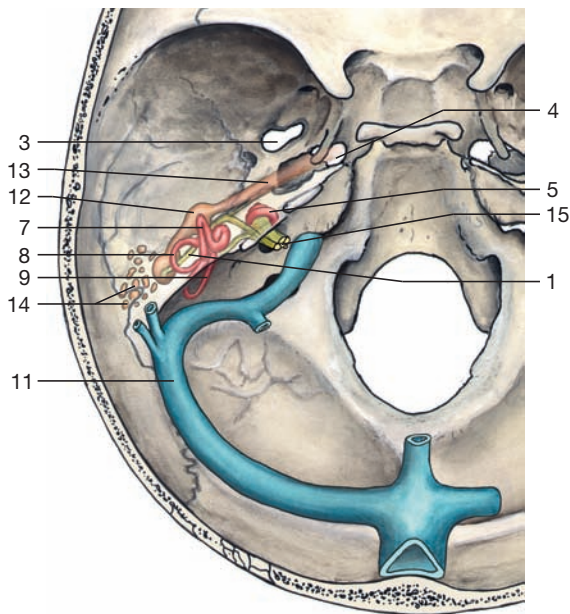


Bony labyrinth, petrous part of the temporal bone (from above). Left: semicircular canals opened; right: semicircular canals closed. Arrows: internal acoustic meatus.

- | | | |
|---|---|-----------------------|
| 1 Facial canal and semicanal of auditory tube | 9 Posterior semicircular canal | 17 Fenestra vestibuli |
| 2 Superior vestibular area | 10 Groove for sigmoid sinus | 18 Promontory |
| 3 Foramen ovale | 11 Sigmoid sinus | 19 Zygomatic process |
| 4 Foramen lacerum | 12 Tympanic cavity | 20 Fenestra cochleae |
| 5 Cochlea | 13 Auditory tube | 21 Mastoid process |
| 6 Vestibule | 14 Mastoid air cells | |
| 7 Anterior semicircular canal | 15 Facial, vestibulocochlear, and intermediate nerves | |
| 8 Lateral semicircular canal | 16 Temporal fossa | |



Bony labyrinth (left lateral aspect). Temporal and tympanic bone partly removed, semicircular canals opened.

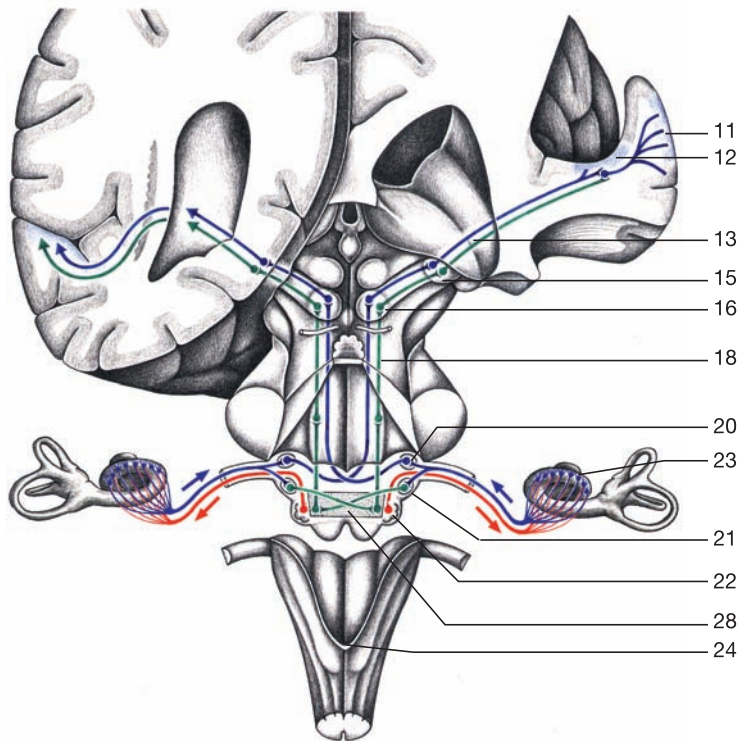


Internal ear (from above). Diagram showing the position of the membranous labyrinth and the tympanic cavity.

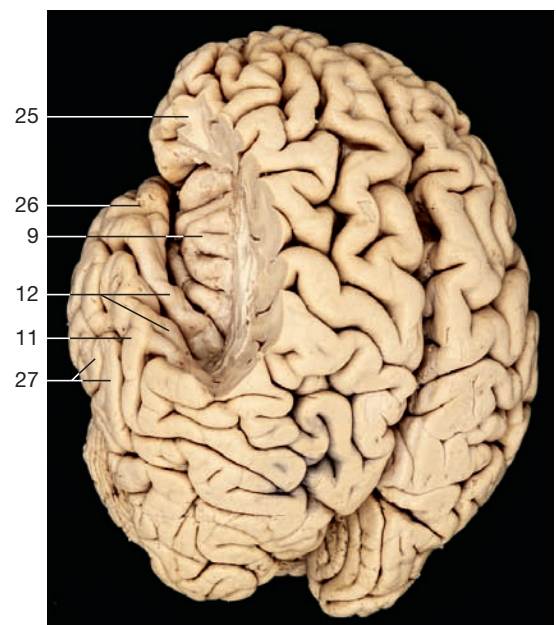


Dissection of the brain stem showing the auditory pathway (posterior aspect). Cerebellum and posterior part of the two hemispheres have been removed.

- 1 Left lateral ventricle and corpus callosum
- 2 Thalamus
- 3 Pineal gland (epiphysis)
- 4 Superior colliculus
- 5 Superior medullary velum and superior cerebellar peduncle
- 6 Rhomboid fossa
- 7 Vestibulocochlear nerve (n. VIII)
- 8 Dorsal acoustic striae and inferior cerebellar peduncle
- 9 Insular lobe
- 10 Caudate nucleus and thalamus
- 11 Temporal lobe (superior temporal gyrus) (area of acoustic centers)
- 12 Transverse temporal gyri of Heschl (area of primary acoustic centers)
- 13 Acoustic radiation of internal capsule
- 14 Lateral geniculate body and optic radiation (cut)
- 15 Medial geniculate body and brachium of inferior colliculus
- 16 Inferior colliculus
- 17 Cerebral peduncle
- 18 Lateral lemniscus
- 19 Middle cerebellar peduncle
- 20 Dorsal (posterior) cochlear nucleus
- 21 Ventral (anterior) cochlear nucleus
- 22 Inferior olive with olivocochlear tract of Rasmussen (red)
- 23 Ganglion spirale
- 24 Obex
- 25 Frontal lobe
- 26 Temporal lobe
- 27 Middle temporal gyrus (area of tertiary acoustic centers)
- 28 Trapezoid body



Auditory pathway (compare with the dissection above). Red = descending (efferent) pathway (olivocochlear tract of Rasmussen); green and blue = ascending (afferent) pathways.



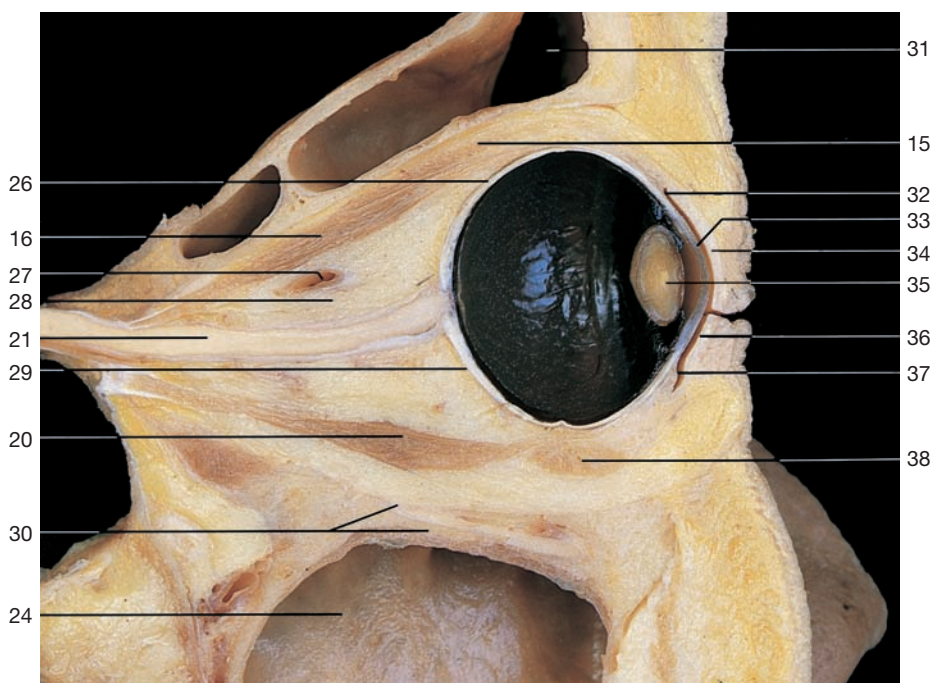
Auditory areas in the left hemisphere (supero-lateral aspect). Parts of the frontal and parietal lobes have been removed.



Bones of the left orbit (indicated by different colors).

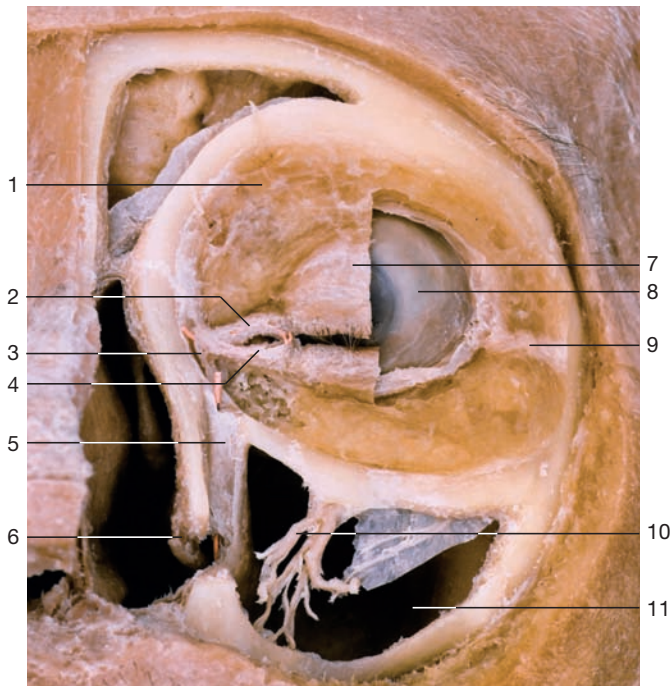


Frontal section through the posterior part of the orbit.

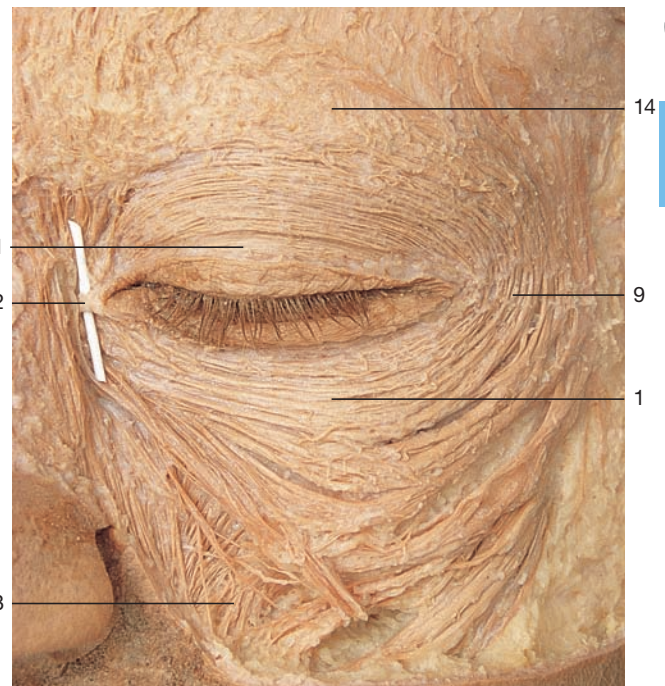


Sagittal section through the orbit and eyeball.

- 1 Frontal bone
- 2 Nasal bone
- 3 Lacrimal bone
- 4 Maxilla (frontal process)
- 5 Ethmoidal foramina
- 6 Lesser wing of sphenoid bone and optic canal
- 7 Superior orbital fissure
- 8 Greater wing of sphenoid bone
- 9 Orbital process of palatine bone
- 10 Orbital plate of ethmoid bone
- 11 Inferior orbital fissure
- 12 Infra-orbital sulcus
- 13 Nasolacrimal canal
- 14 Zygomatic bone
- 15 Levator palpebrae superioris muscle
- 16 Superior rectus muscle
- 17 Superior oblique muscle
- 18 Lateral rectus muscle
- 19 Medial rectus muscle
- 20 Inferior rectus muscle
- 21 Optic nerve (n. II)
- 22 Nasal septum
- 23 Middle nasal concha
- 24 Maxillary sinus
- 25 Inferior nasal concha
- 26 Sclera
- 27 Ophthalmic artery
- 28 Orbital fatty tissue
- 29 Tenon's space
- 30 Periorbita and maxilla
- 31 Frontal sinus
- 32 Superior conjunctival fornix
- 33 Cornea
- 34 Superior tarsal plate
- 35 Lens
- 36 Inferior tarsal plate
- 37 Inferior conjunctival fornix
- 38 Inferior oblique muscle

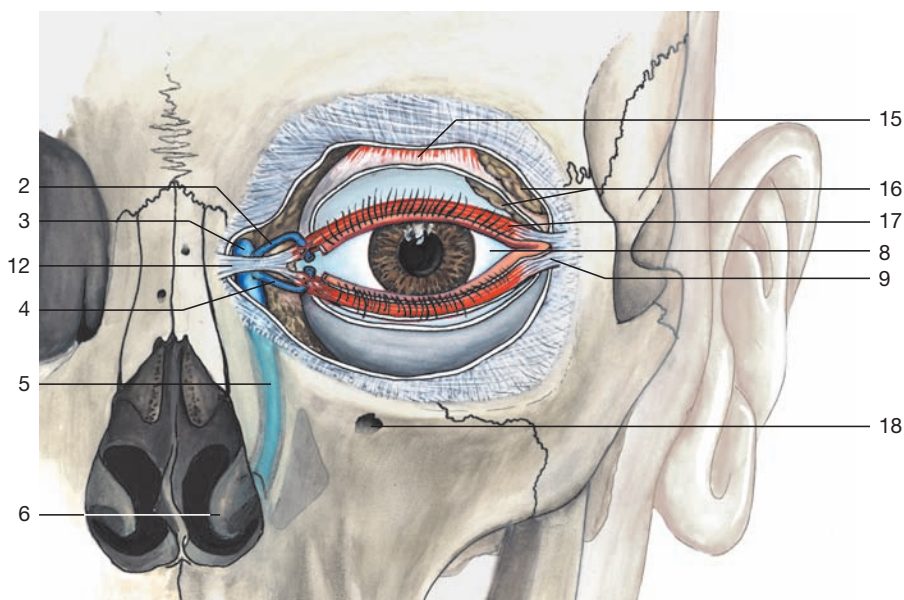


Lids and lacrimal apparatus of the left eye (anterior aspect). Parts of the eyelids have been removed to reveal the underlying eyeball. The maxillary sinus has been opened.



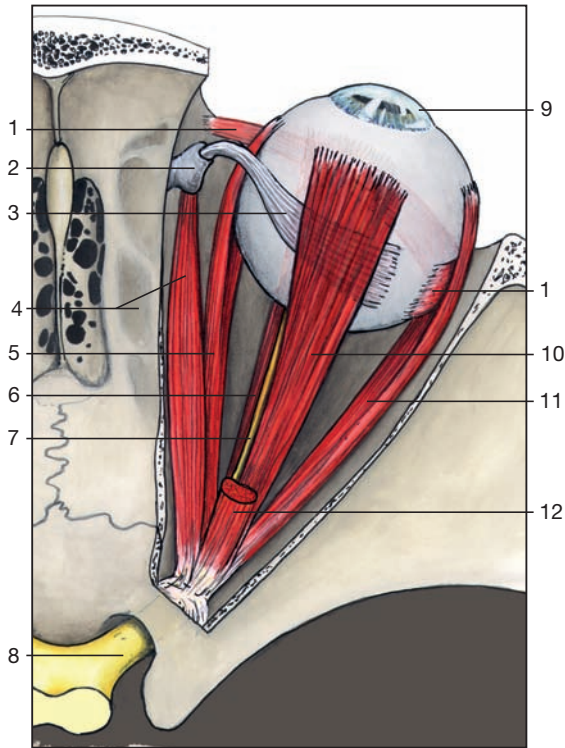
Facial muscles of the left eye (anterior aspect). The orbicularis oculi muscle and its connection to the superior labial muscles are shown. Note the medial palpebral ligament (probe).

- | | |
|---------------------------------|---|
| 1 Orbicularis oculi muscle | 10 Infra-orbital artery and nerve |
| 2 Superior lacrimal canaliculus | 11 Maxillary sinus |
| 3 Lacrimal sac | 12 Medial palpebral ligament |
| 4 Inferior lacrimal canaliculus | 13 Levator labii superioris muscle |
| 5 Nasolacrimal duct | 14 Frontal belly of occipitofrontalis muscle |
| 6 Inferior nasal concha | 15 Aponeurosis of levator palpebrae superioris muscle |
| 7 Upper eyelid | 16 Lacrimal gland |
| 8 Eyeball | 17 Palpebral portion of orbicularis oculi muscle |
| 9 Lateral palpebral ligament | 18 Infra-orbital foramen |

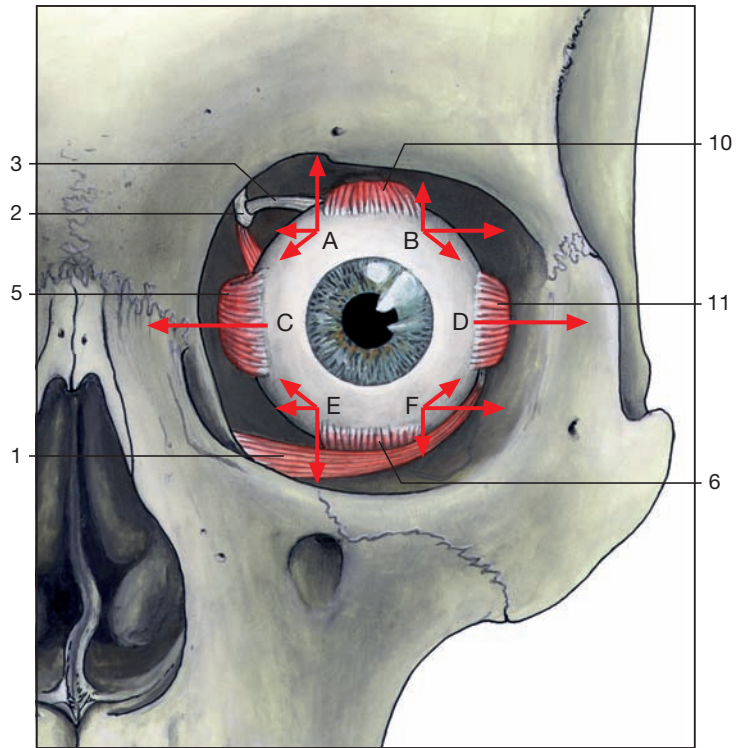


Lacrimal apparatus of the left eye (anterior aspect).

Red = Palpebral portion of the orbicularis oculi muscle.



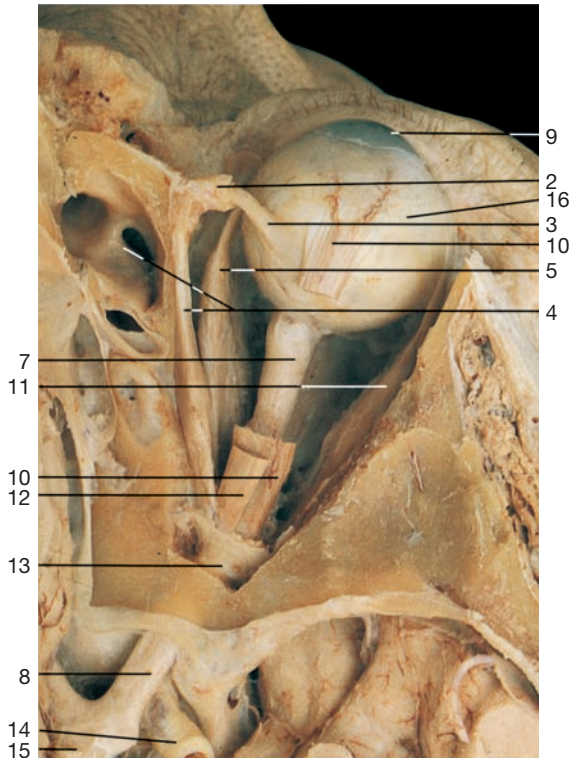
Right orbit with eyeball and extra-ocular muscles (from above). Levator palpebrae superioris muscle has been severed.



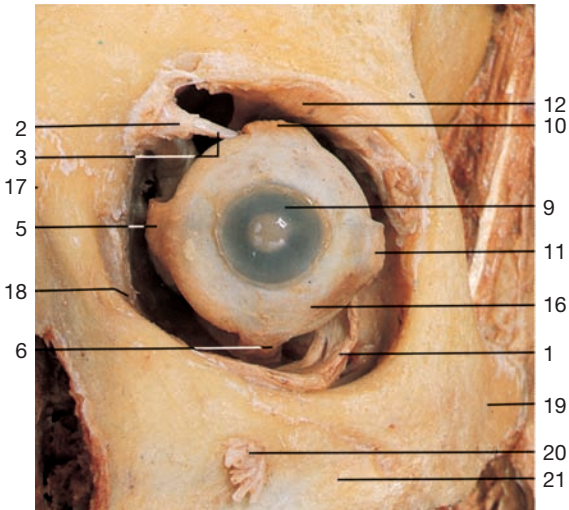
Action of the extra-ocular muscles (anterior aspect).

A = Superior rectus muscle
B = Inferior oblique muscle
C = Medial rectus muscle

D = Lateral rectus muscle
E = Inferior rectus muscle
F = Superior oblique muscle

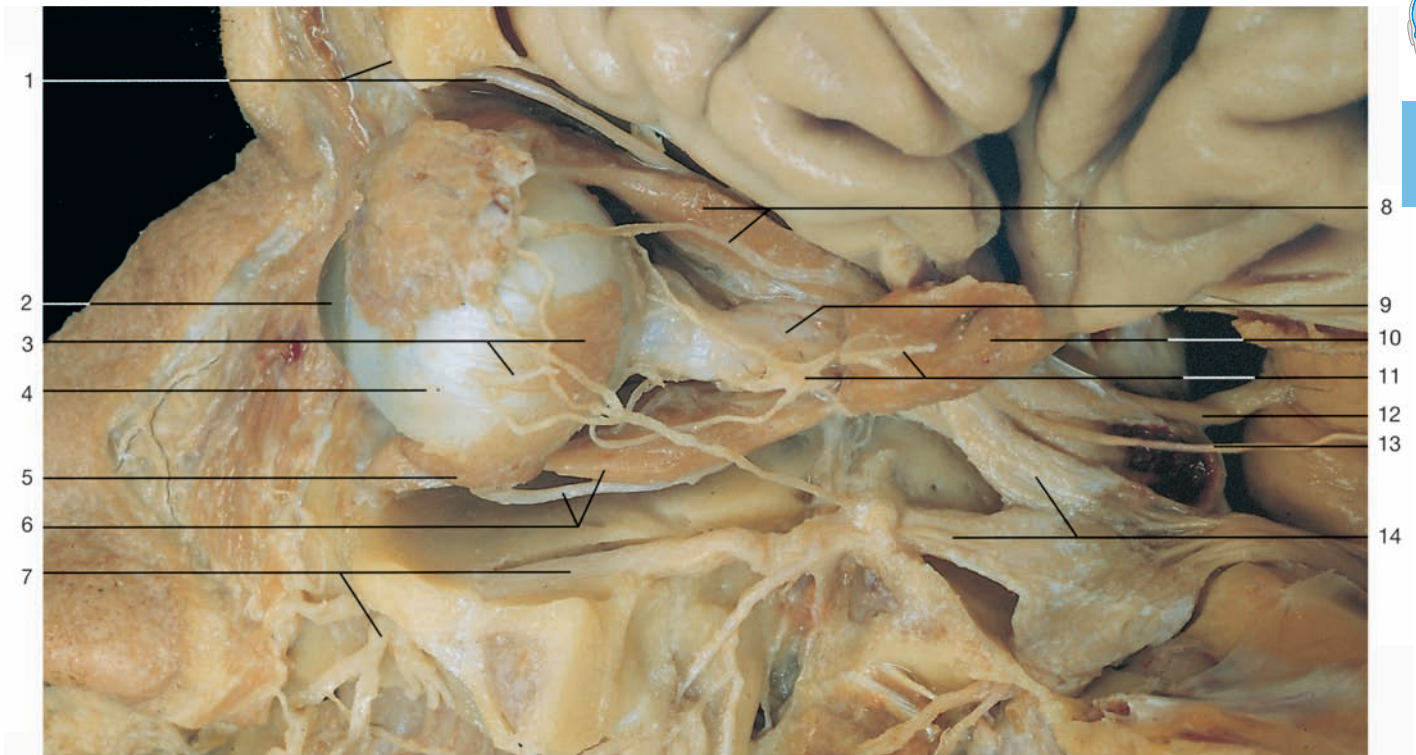


Right orbit with eyeball and extra-ocular muscles (from above). The roof of the orbit has been removed, the superior rectus muscle and the levator palpebrae superioris muscle have been severed.

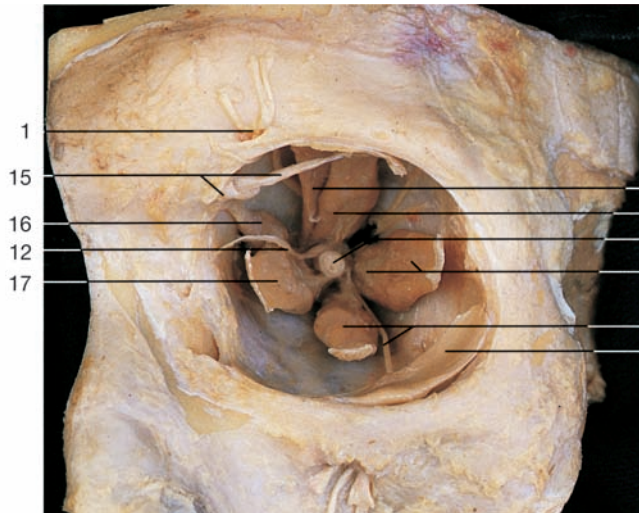


Left orbit with eyeball and extra-ocular muscles (anterior aspect). Lids, conjunctiva, and lacrimal apparatus have been removed.

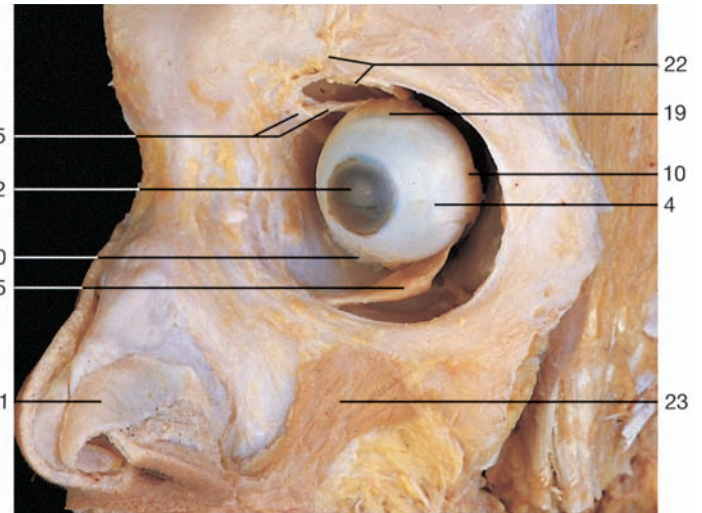
- | | |
|---|--|
| 1 Inferior oblique muscle | 12 Levator palpebrae superioris muscle |
| 2 Trochlea | 13 Common annular tendon |
| 3 Tendon of superior oblique muscle | 14 Internal carotid artery |
| 4 Superior oblique muscle and ethmoid air cells | 15 Optic chiasma |
| 5 Medial rectus muscle | 16 Sclera |
| 6 Inferior rectus muscle | 17 Nasal bone |
| 7 Optic nerve (extracranial part) | 18 Nasolacrimal duct |
| 8 Optic nerve (intracranial part) | 19 Zygomatic bone |
| 9 Cornea | 20 Infra-orbital nerves |
| 10 Superior rectus muscle | 21 Maxilla |
| 11 Lateral rectus muscle | |



Extra-ocular muscles and their nerves (lateral aspect of the left eye). Lateral rectus muscle divided and reflected.



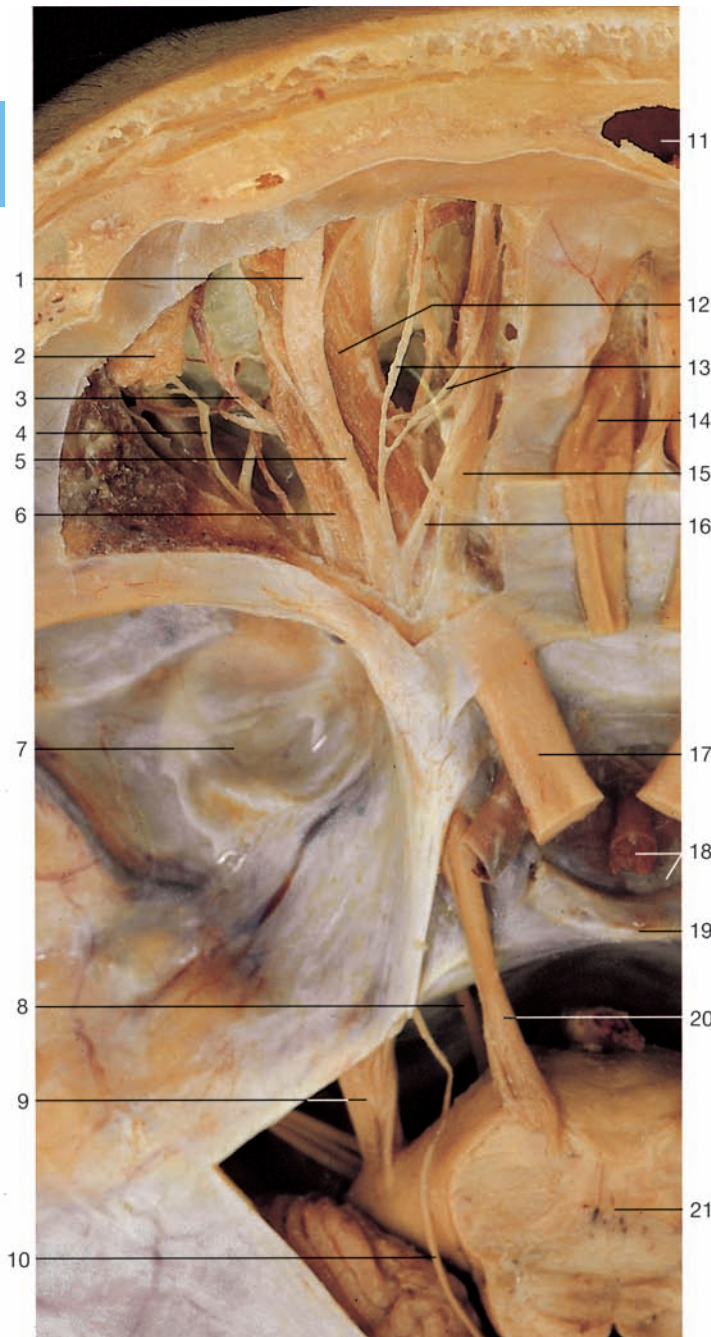
Left orbit with extra-ocular muscles (anterior aspect). Eyeball removed.



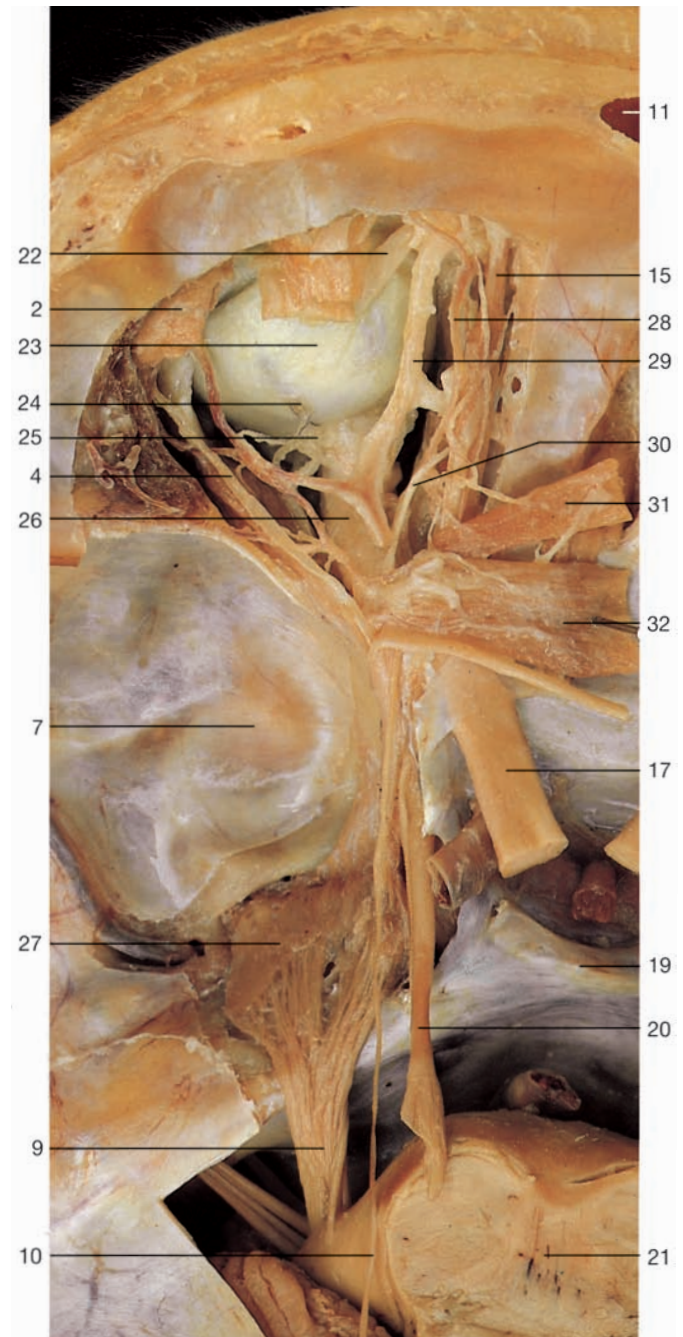
Extra-ocular muscles (antero-lateral aspect).

- 1 Supra-orbital nerve
- 2 Cornea
- 3 Insertion of lateral rectus muscle
- 4 Eyeball (sclera)
- 5 Inferior oblique muscle
- 6 Inferior rectus muscle and inferior branch of oculomotor nerve
- 7 Infra-orbital nerve
- 8 Superior rectus muscle and lacrimal nerve
- 9 Optic nerve (n. II)
- 10 Lateral rectus muscle
- 11 Ciliary ganglion and abducens nerve (n. VI)

- 12 Oculomotor nerve (n. III)
- 13 Trochlear nerve (n. IV)
- 14 Ophthalmic nerve (n. V₁) and maxillary nerve (n. V₂)
- 15 Trochlea and tendon of superior oblique muscle
- 16 Superior oblique muscle
- 17 Medial rectus muscle
- 18 Levator palpebrae superioris muscle
- 19 Superior rectus muscle
- 20 Inferior rectus muscle
- 21 Greater alar cartilage
- 22 Supra-orbital nerve and levator palpebrae superioris muscle
- 23 Levator labii superioris muscle



Superficial layer of the left orbit (superior aspect). The roof of the orbit and a portion of the left tentorium have been removed.

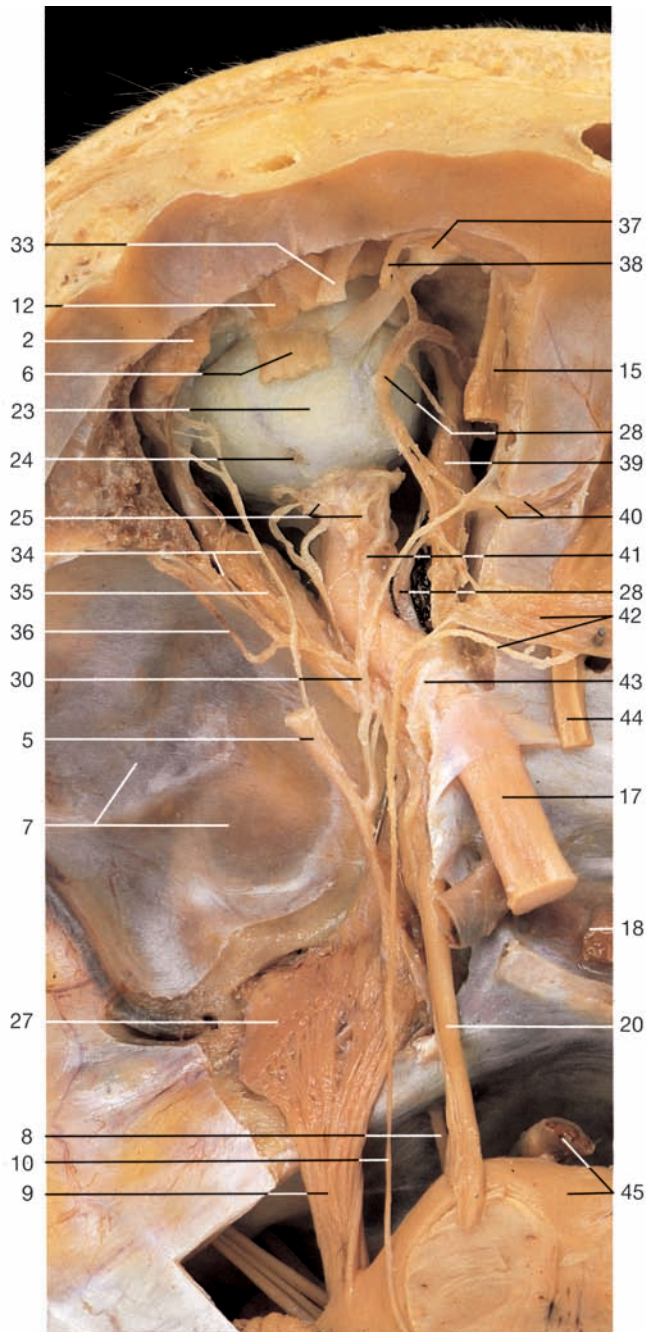


Middle layer of the left orbit (superior aspect). The roof of the orbit has been removed and the superior extra-ocular muscles have been divided and reflected.

- 1 Lateral branch of frontal nerve
- 2 Lacrimal gland
- 3 Lacrimal vein
- 4 Lacrimal nerve
- 5 Frontal nerve
- 6 Superior rectus
- 7 Middle cranial fossa
- 8 Abducent nerve (n. VI)
- 9 Trigeminal nerve (n. V)

- 10 Trochlear nerve (intracranial part)
- 11 Frontal sinus
- 12 Levator palpebrae superioris muscle
- 13 Branches of supratrochlear nerve
- 14 Olfactory bulb
- 15 Superior oblique muscle
- 16 Trochlear nerve (intra-orbital part)
- 17 Optic nerve (intracranial part)
- 18 Pituitary gland and infundibulum

- 19 Dorsum sellae
- 20 Oculomotor nerve (n. III)
- 21 Midbrain
- 22 Tendon of superior oblique muscle
- 23 Eyeball
- 24 Vena vorticiosa
- 25 Short ciliary nerves
- 26 Optic nerve (extracranial part)
- 27 Trigeminal ganglion



Middle layer of the left orbit (superior aspect). The roof of the orbit and the superior extra-ocular muscles have been removed.

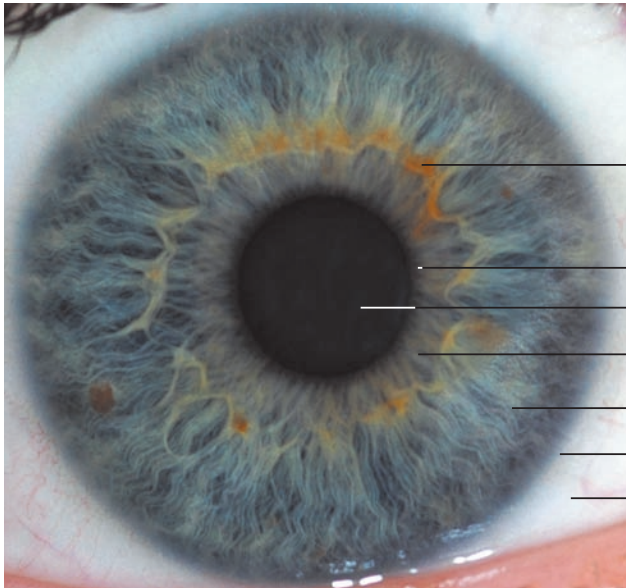


Deeper layer of the left orbit (superior aspect). The optic nerve has now been removed.

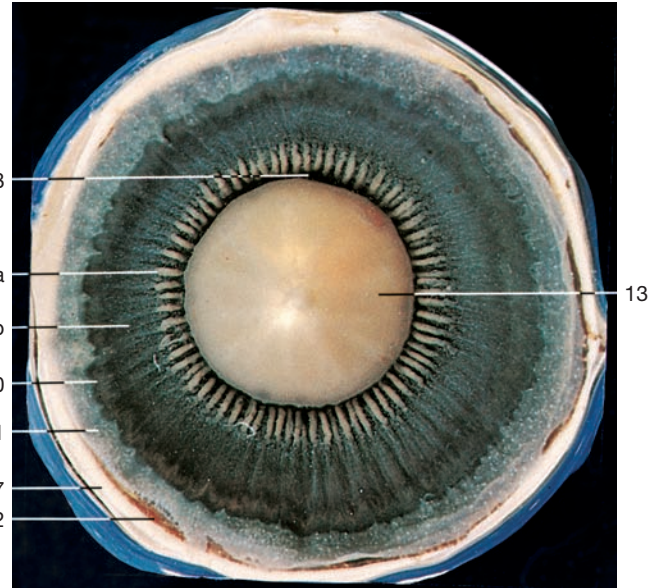
- 28 Ophthalmic artery
- 29 Superior ophthalmic vein
- 30 Nasociliary nerve
- 31 Levator palpebrae superioris muscle (reflected)
- 32 Superior rectus muscle (reflected)
- 33 Lateral branch of supra-orbital nerve
- 34 Lacrimal nerve and artery
- 35 Lateral rectus muscle
- 36 Meningolacrimal artery (anastomosing with middle meningeal artery)

- 37 Trochlea
- 38 Medial branch of supra-orbital nerve
- 39 Medial rectus muscle
- 40 Anterior ethmoidal artery and nerve
- 41 Long ciliary nerve
- 42 Superior oblique muscle and trochlear nerve
- 43 Common tendinous ring
- 44 Olfactory tract

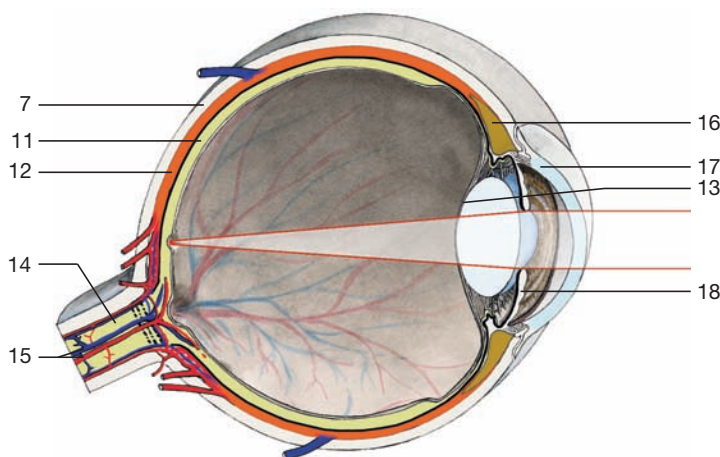
- 45 Basilar artery and pons
- 46 Optic nerve (external sheath of optic nerve, divided)
- 47 Ciliary ganglion
- 48 Ophthalmic nerve (divided, reflected)
- 49 Inferior branch of oculomotor nerve and inferior rectus muscle
- 50 Superior branch of oculomotor nerve
- 51 Internal carotid artery



Anterior segment of the human eye. Note the colored iris and the location of the lens behind the iris.

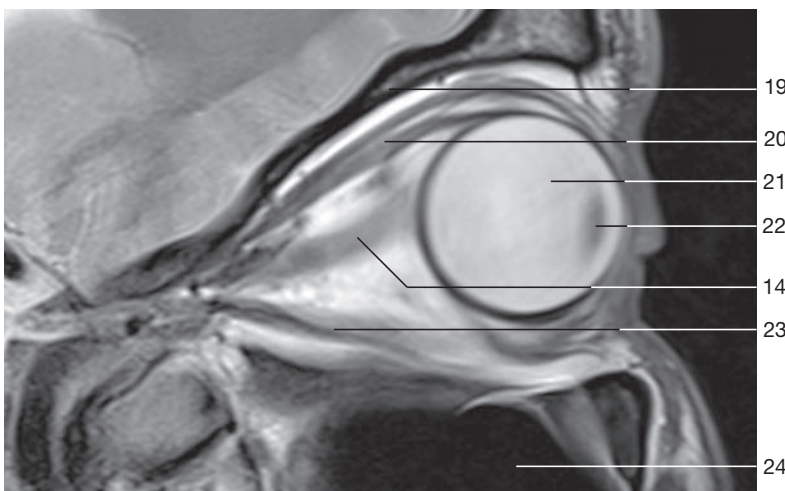


Anterior segment of the eyeball (posterior aspect). The opacity of the lens is an artifact.

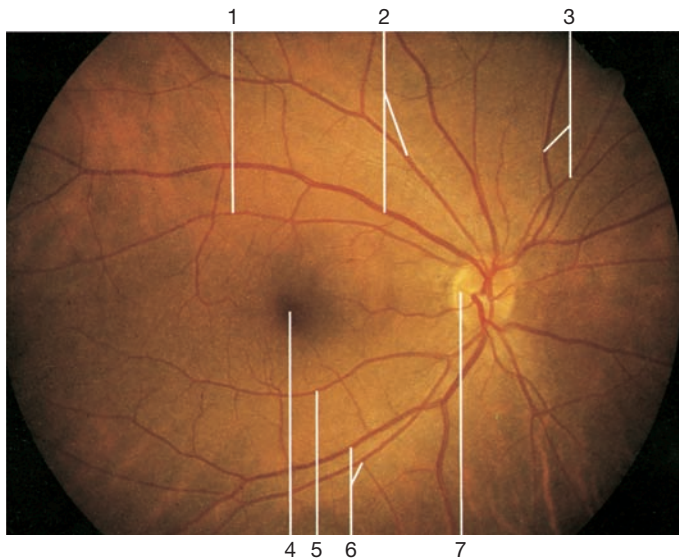


Organization of the eyeball (sagittal section).
Red lines = projection of the light on the fovea centralis.

- 1 Fold of iris
- 2 Pupillary margin of iris
- 3 Anterior surface of the lens
- 4 Inner border of iris
- 5 Outer border of iris
- 6 Corneal limbus
- 7 Sclera
- 8 Zonular fibers
- 9 Ciliary body
 - a Ciliary processes (pars plicata)
 - b Ciliary ring (pars plana)
- 10 Ora serrata
- 11 Retina
- 12 Choroid
- 13 Posterior surface of the lens
- 14 Optic nerve (n. II)
- 15 Central retinal artery and vein
- 16 Ciliary muscle
- 17 Cornea
- 18 Iris
- 19 Orbital bone
- 20 Superior rectus muscle
- 21 Vitreous body
- 22 Lens
- 23 Inferior rectus muscle
- 24 Maxillary sinus

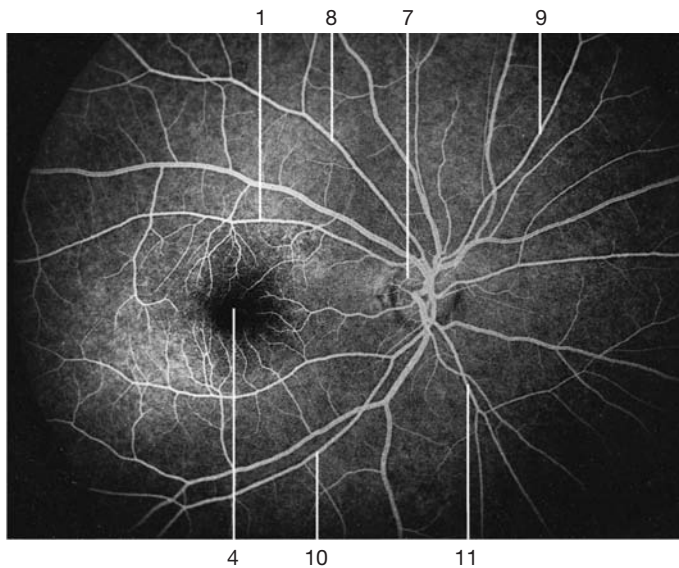


Sagittal section through the orbit and eyeball (MRI scan).
(Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

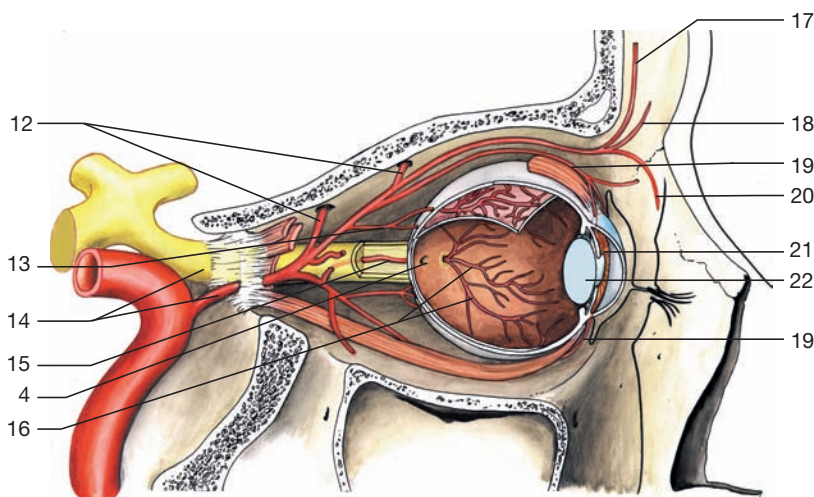


Fundus of a normal right eye. Notice, the arteries are smaller and lighter than the veins. (Courtesy of Prof. Okamura, Eye Dept., Univ. Kumamoto, Japan.)

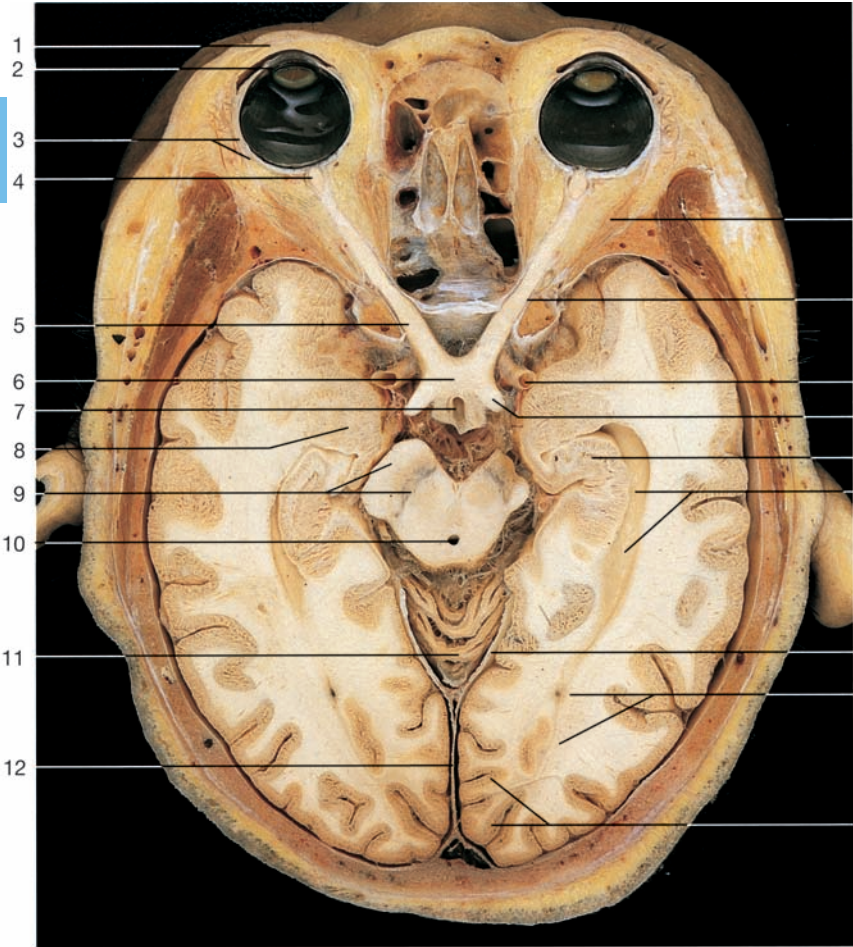
- 1 Superior macular artery
- 2 Superior temporal artery and vein of retina
- 3 Medial artery and vein of retina
- 4 Fovea centralis and macula lutea
- 5 Inferior macular artery
- 6 Inferior temporal artery and vein of retina
- 7 Optic disc
- 8 Superior temporal artery of retina
- 9 Superior nasal artery of retina
- 10 Inferior temporal artery of retina
- 11 Inferior nasal artery of retina
- 12 Posterior and anterior ethmoidal arteries
- 13 Long and short posterior ciliary arteries
- 14 Optic nerve (n. II) and ophthalmic artery
- 15 Central retinal artery
- 16 Retinal arteries
- 17 Supratrochlear artery
- 18 Supra-orbital artery
- 19 Anterior ciliary artery
- 20 Dorsal nasal artery
- 21 Iridial arteries
- 22 Lens



Fluorescent angiography of the right eye (the same eye as above). The retinal vessels are shown. (Courtesy of Prof. Okamura, Eye Dept., Univ. Kumamoto, Japan.)

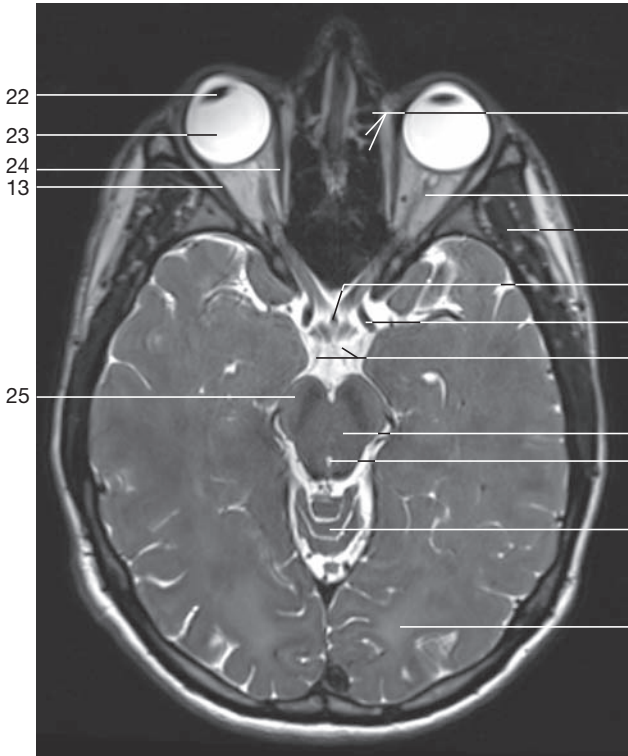


Orbit with eyeball, optic nerve, and vessels of the eye. The ophthalmic artery and its branches are shown.



- 1 Upper lid
 - 2 Cornea
 - 3 Eyeball (sclera, retina)
 - 4 Head of optic nerve
 - 5 Optic nerve
 - 6 Optic chiasma
 - 7 Infundibular recess of hypothalamus
 - 8 Amygdaloid body
 - 9 Substantia nigra and crus cerebri
 - 10 Cerebral aqueduct
 - 11 Vermis of cerebellum
 - 12 Falx cerebri
 - 13 Lateral rectus muscle
 - 14 Optic canal
 - 15 Internal carotid artery
 - 16 Optic tract
 - 17 Hippocampus
 - 18 Inferior horn of lateral ventricle
 - 19 Cerebellar tentorium
 - 20 Optic radiation of Gratiolet
 - 21 Visual cortex (area calcarina, striate cortex)
- 22 Lens
 - 23 Eyeball
 - 24 Medial rectus muscle
 - 25 Cerebral peduncle
 - 26 Ethmoidal cells
 - 27 Optic nerve (n. II) with dura sheath
 - 28 Temporal muscle
 - 29 Oculomotor nerve (n. III) and pituitary gland (hypophysis)

Horizontal section through the head at the level of optic chiasma and striate cortex (superior aspect). Note the relationship of hypothalamic infundibulum to optic chiasma.



Horizontal section through the head at the level of sella turcica (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

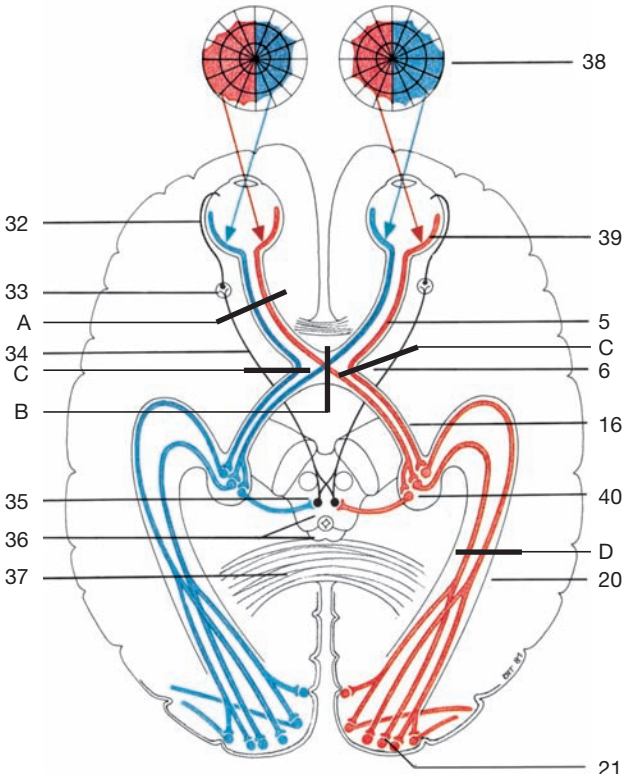
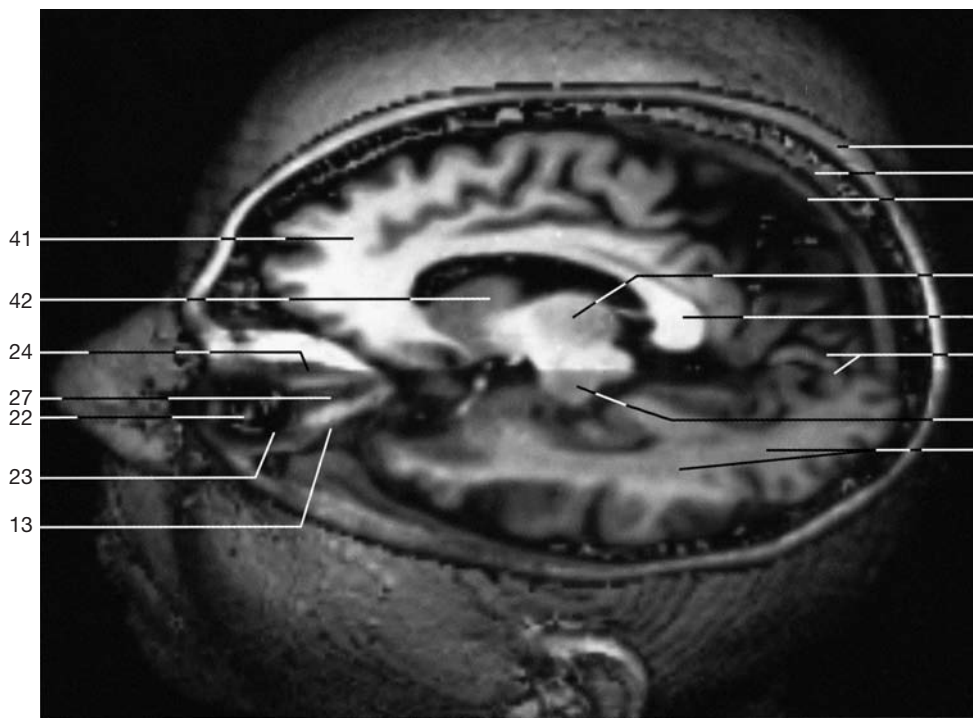
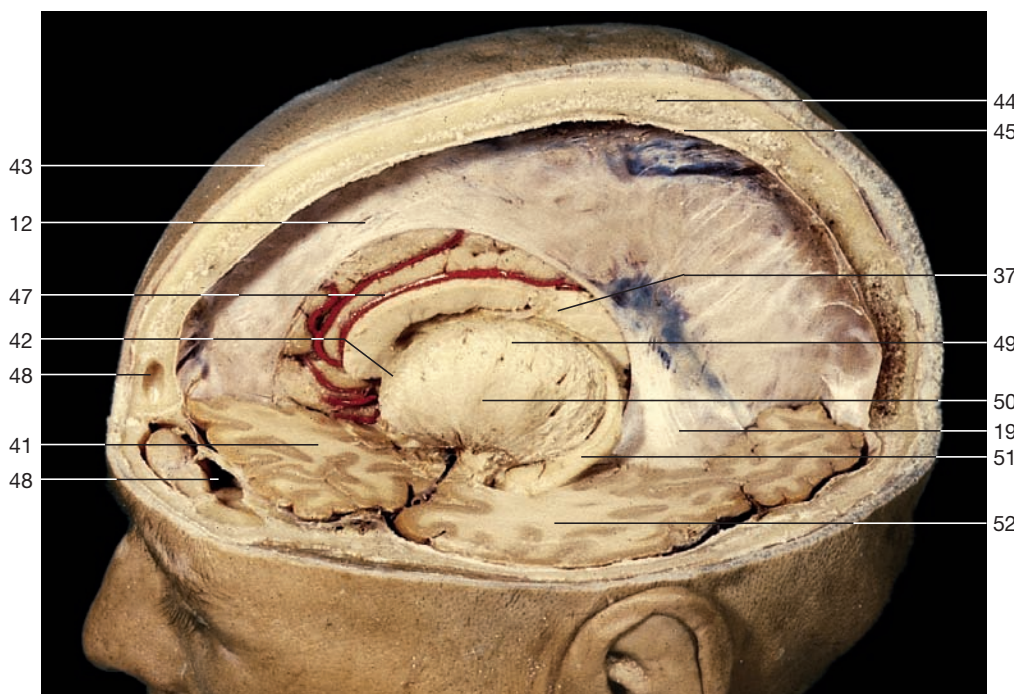


Diagram of the visual pathway and path of the light reflex.



- 30 Midbrain
- 31 Occipital lobe
- 32 Long and short ciliary nerves
- 33 Ciliary ganglion
- 34 Oculomotor nerve (n. III) within the cavernous sinus
- 35 Accessory oculomotor nuclei
- 36 Colliculi of midbrain
- 37 Corpus callosum
- 38 Visual field
- 39 Retina
- 40 Lateral geniculate body
- 41 Frontal lobe
- 42 Caudate nucleus
- 43 Skin of scalp
- 44 Diploe of the skull
- 45 Dura mater
- 46 Thalamus
- 47 Anterior cerebral artery
- 48 Frontal sinus
- 49 Internal capsule
- 50 Lentiform nucleus (putamen)
- 51 Hippocampus
- 52 Temporal lobe of the left hemisphere

3-D reconstruction of the human visual pathway (MRI scan). (Prof. Huk, Univ. Erlangen-Nuremberg, Germany.)



Dissection of brain stem in situ. Left hemisphere has been partly removed (compare with the MRI scan above).

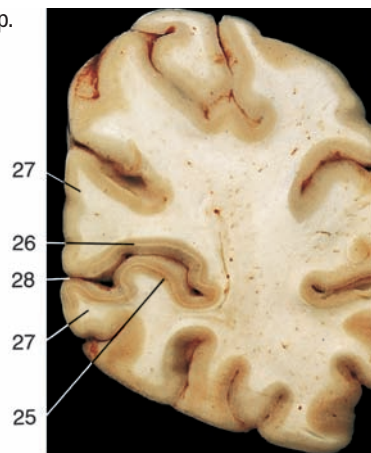
In **binocular vision** the visual field (38) is projected upon portions of both retinae (blue and red in the drawing). In the chiasma the fibers from the two retinal portions are combined to form the left optic tract. The fibers of the two eyes remain separated from each other throughout the entire visual pathway up to their final termination in the visual cortex (21). **Injuries on the optic pathway** produce visual defects whose nature depends on the location of the injury. Destruction of one optic nerve (A) produces **blindness in the corresponding eye** with loss of pupillary

light reflex. If **lesions of the chiasma** destroy the crossing fibers of the nasal portions of the retina (B), both temporal fields of vision are lost (**bitemporal hemianopsia**). If both lateral angles of the chiasma are compressed (C), the nondecussating fibers from the temporal retinae are affected, resulting in loss of nasal visual fields (**binasal hemianopsia**). Lesions posterior to the chiasma (D) (i.e., optic tract, lateral geniculate body, optic radiation, or visual cortex) result in a loss of the entire opposite field of vision (**homonymous hemianopsia**).



Dissection of the visual pathway (inferior aspect). The midbrain is divided. Frontal pole at the top.

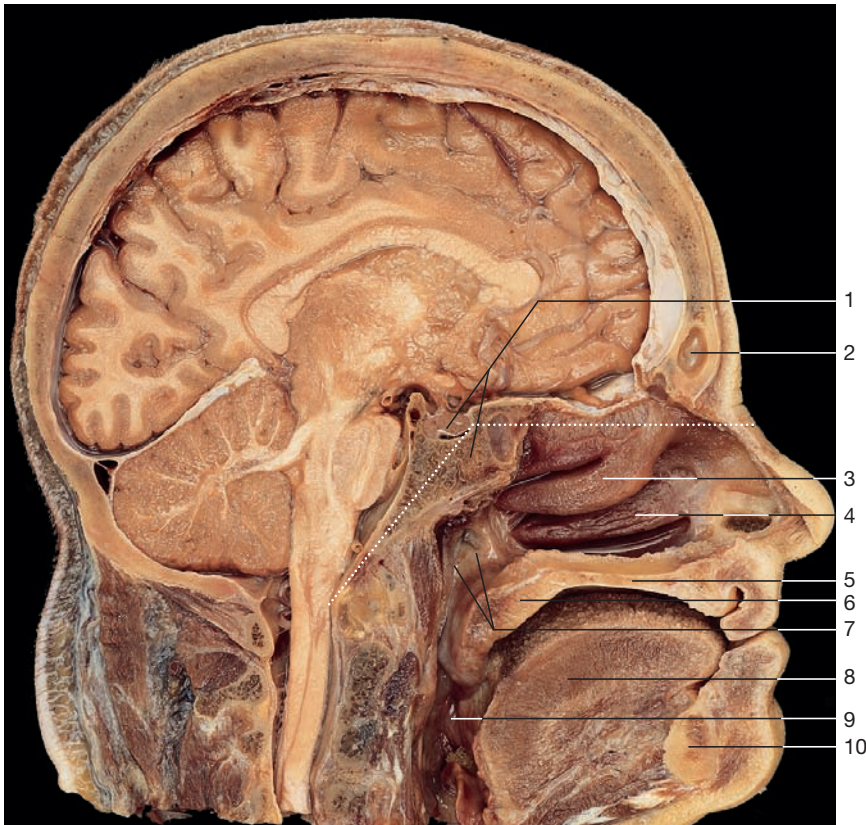
- | | |
|---|---|
| 1 Medial olfactory stria | 15 Olfactory tract |
| 2 Olfactory trigone | 16 Optic nerve (n. II) |
| 3 Lateral olfactory stria | 17 Infundibulum |
| 4 Anterior perforated substance | 18 Anterior commissure |
| 5 Oculomotor nerve (n. III) | 19 Genu of optic radiation |
| 6 Mamillary body | 20 Optic tract |
| 7 Cerebral peduncle | 21 Interpeduncular fossa and posterior perforated substance |
| 8 Lateral geniculate body | 22 Trochlear nerve (n. IV) |
| 9 Medial geniculate body | 23 Substantia nigra |
| 10 Pulvinar of thalamus | 24 Cerebral aqueduct |
| 11 Optic radiation | 25 Visual cortex |
| 12 Splenium of the corpus callosum (commissural fibers) | 26 Line of Gennari |
| 13 Cuneus | 27 Gyrus of striate cortex |
| 14 Olfactory bulb | 28 Calcarine sulcus |



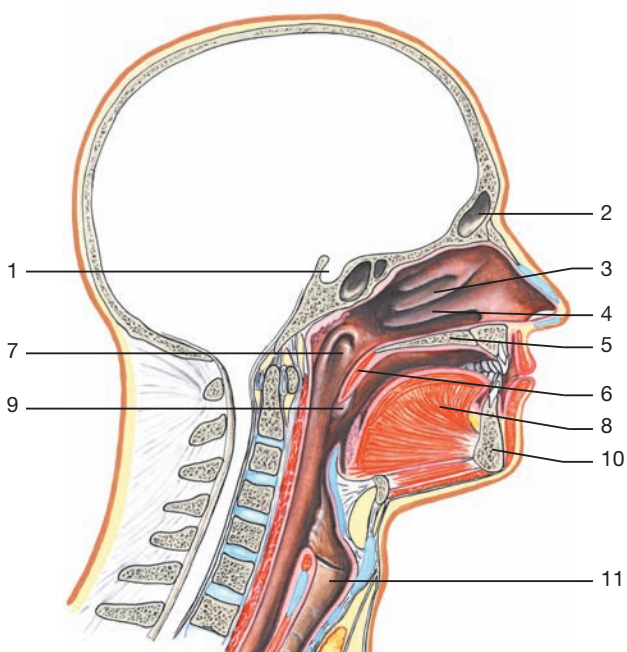
Frontal section of the striate cortex at the level of the striate area in the occipital lobe.



2.5 Nasal and Oral Cavities

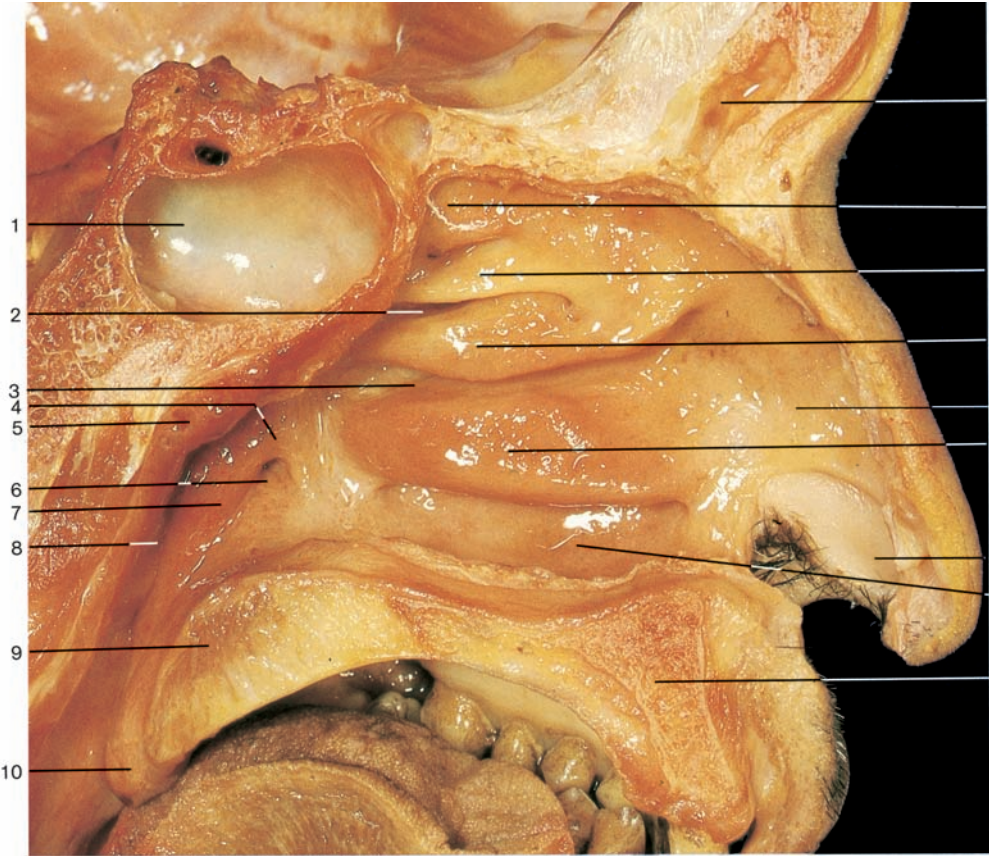


Median sagittal section through the head. The palate separates nasal and oral cavities. The base of the skull forms an angle of about 150° at the sella turcica (dotted line).



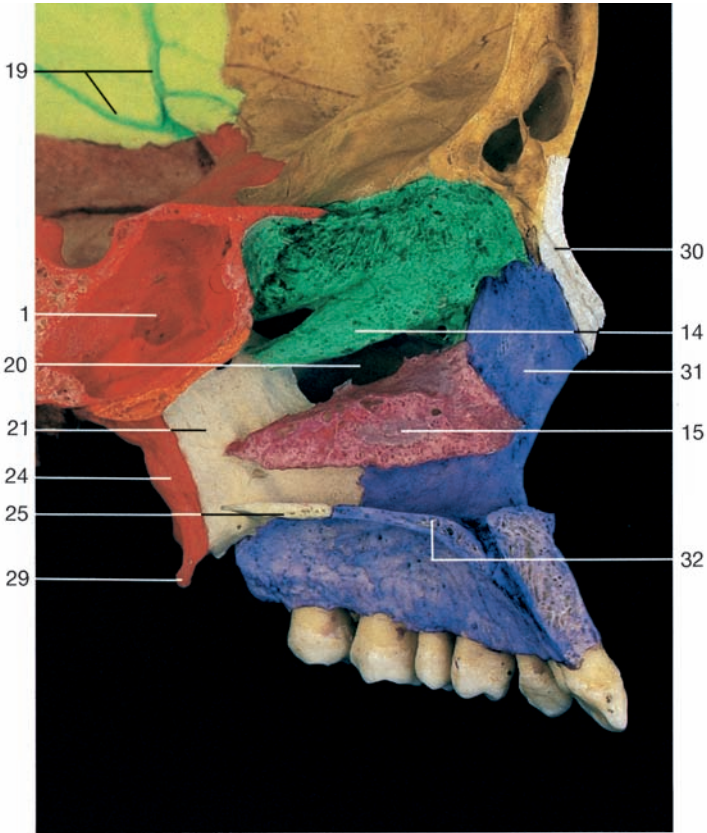
- 1 Hypophysis within hypophysial fossa
- 2 Frontal sinus
- 3 Middle nasal concha
- 4 Inferior nasal concha
- 5 Hard palate
- 6 Soft palate
- 7 Pharynx with auditory tube
- 8 Tongue
- 9 Pharynx with palatine tonsil
- 10 Mandible
- 11 Larynx

Median sagittal section through the head. The tongue has been disposed to show the connection of the oral cavity with the pharynx and the position of the palatine tonsil.

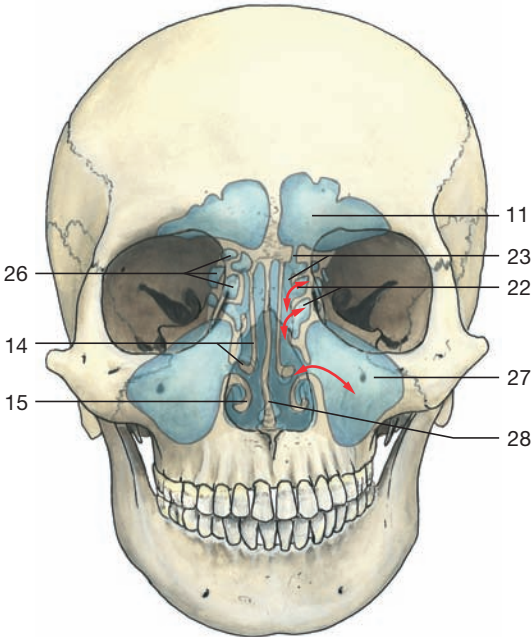


Lateral wall of the nasal cavity. Septum removed.

- 1 Sphenoidal sinus
- 2 Superior meatus
- 3 Middle meatus
- 4 Tubal elevation
- 5 Pharyngeal tonsil
- 6 Pharyngeal orifice of auditory tube
- 7 Salpingopharyngeal fold
- 8 Pharyngeal recess
- 9 Soft palate
- 10 Uvula
- 11 Frontal sinus
- 12 Spheno-ethmoidal recess
- 13 Superior nasal concha
- 14 Middle nasal concha
- 15 Inferior nasal concha
- 16 Vestibule
- 17 Inferior meatus
- 18 Hard palate
- 19 Grooves for the middle meningeal artery and parietal bone (yellow)
- 20 Maxillary hiatus
- 21 Perpendicular process of palatine bone
- 22 Openings of ethmoidal air cells
- 23 Nasofrontal duct
- 24 Medial pterygoid plate (red)
- 25 Horizontal plate of palatine process
- 26 Ethmoidal air cells
- 27 Maxillary sinus
- 28 Nasal septum
- 29 Pterygoid hamulus
- 30 Nasal bone (white)
- 31 Frontal process of maxilla (violet)
- 32 Palatine process of maxilla (violet)
- 33 Nasal atrium



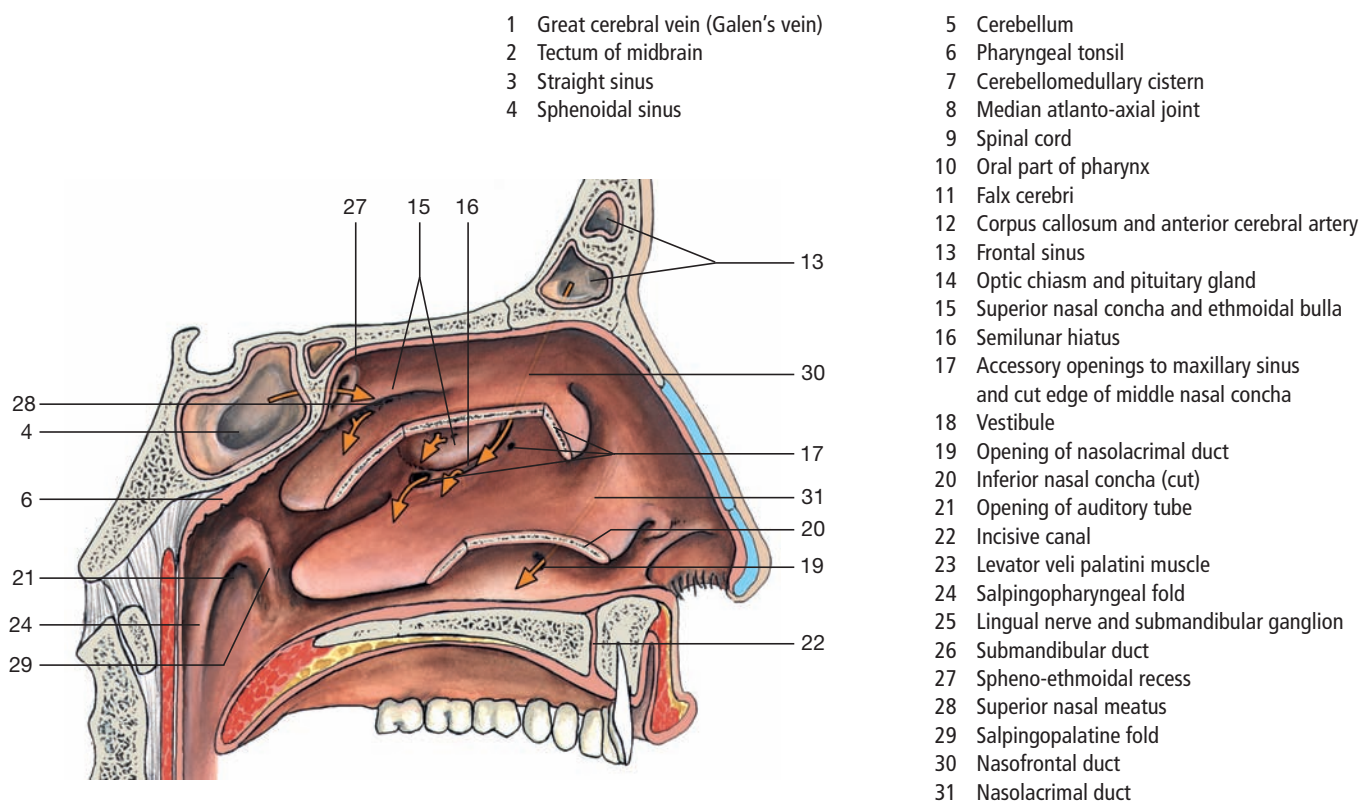
Bones of the left nasal cavity (medial aspect).



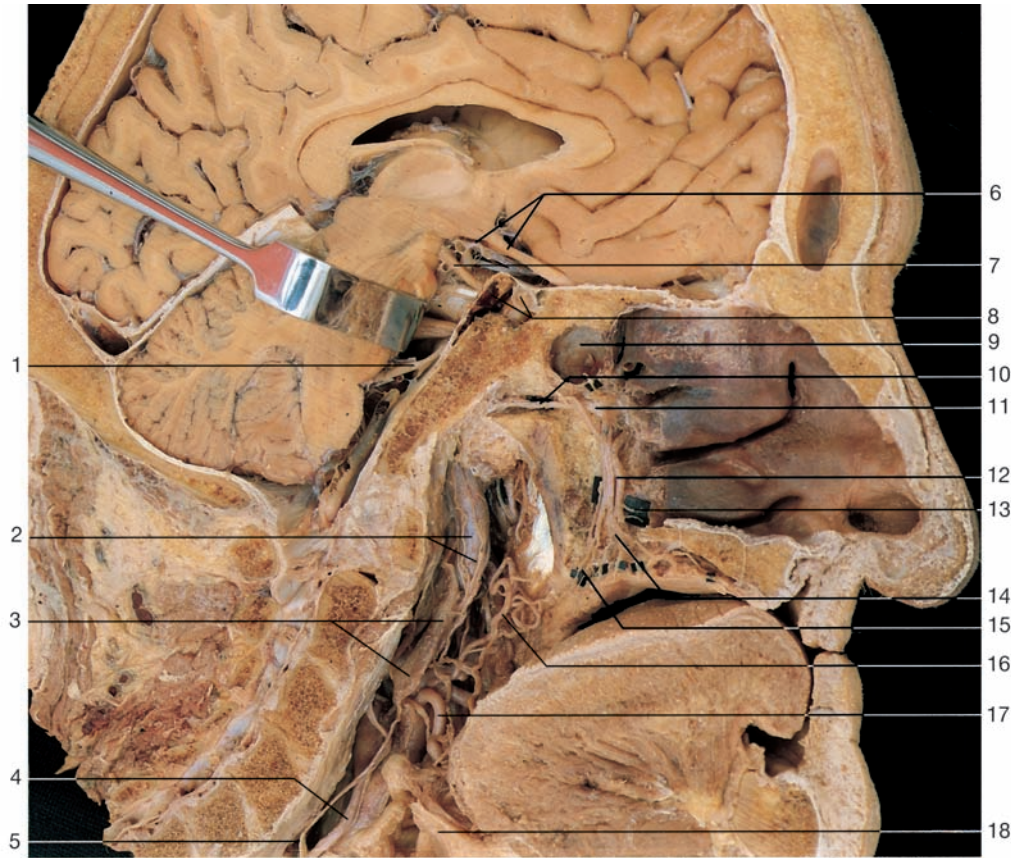
Paranasal sinuses and their connections with the nasal cavity. Openings indicated by arrows.



Median section through the head with nasal and oral cavities. The middle and inferior nasal conchae have been partly removed to show the openings of paranasal sinuses.

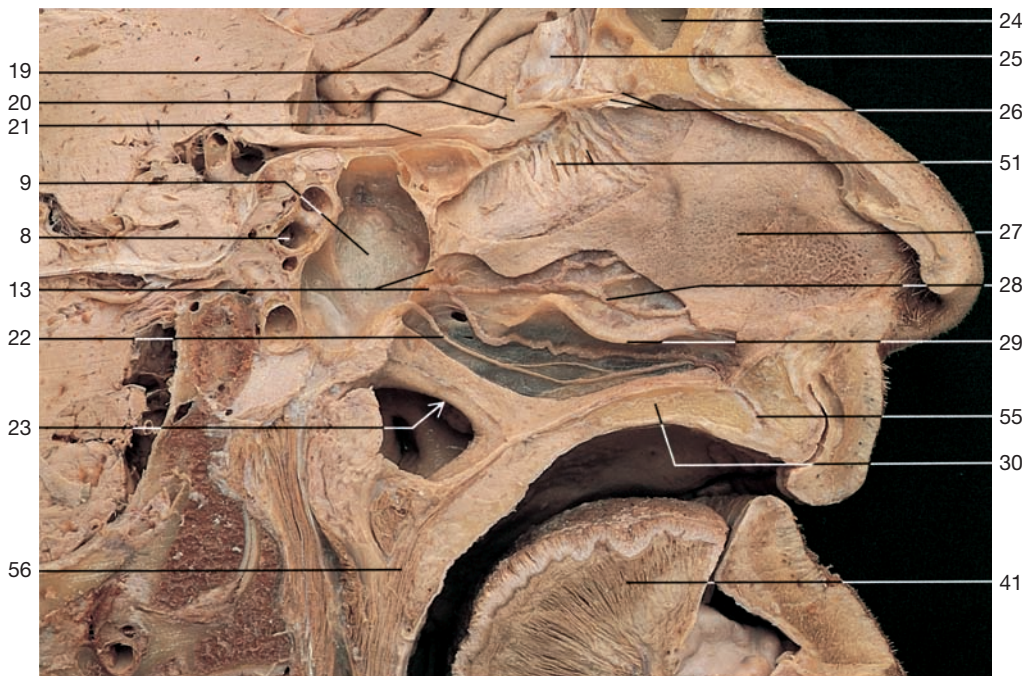


Lateral wall of the nasal cavity. Openings indicated by arrows.



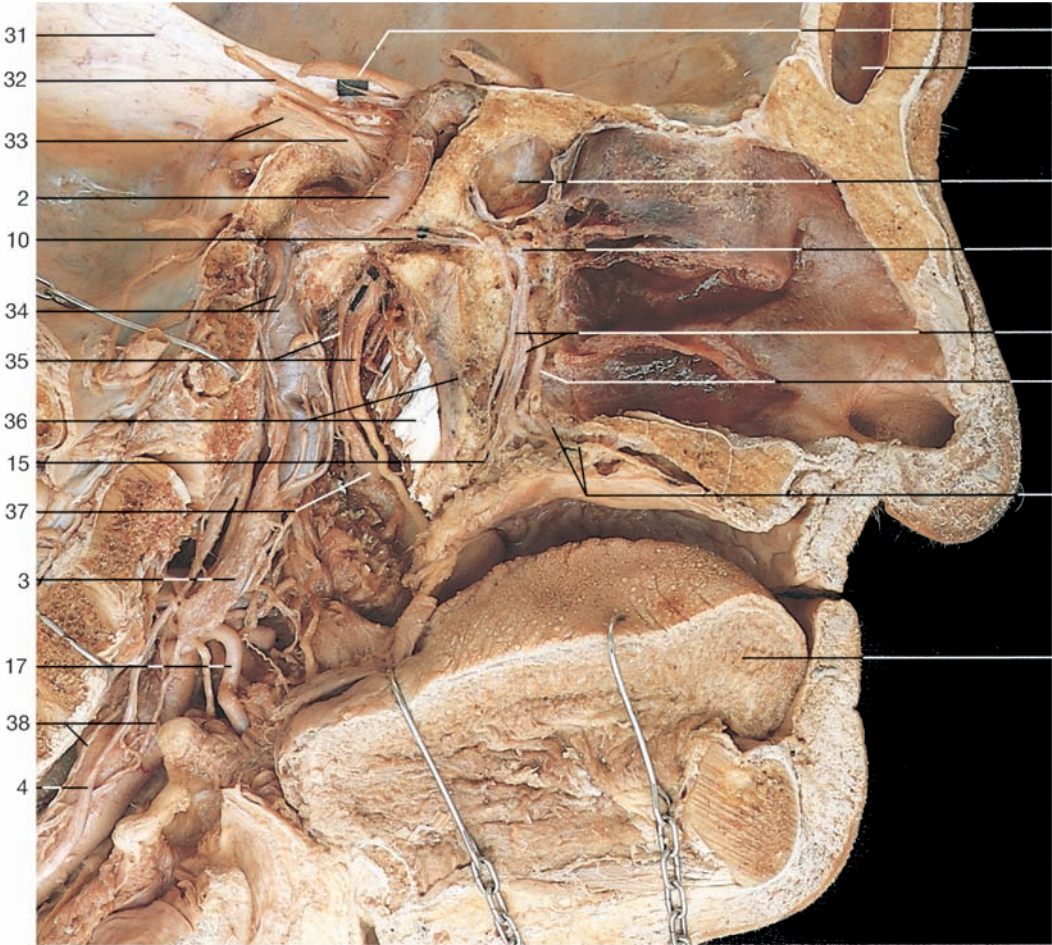
Nerves of the lateral wall of nasal cavity (sagittal section through the head). Mucous membranes partly removed, pterygoid canal opened.

- 1 Facial nerve
- 2 Internal carotid artery and internal carotid plexus
- 3 Superior cervical ganglion
- 4 Vagus nerve (n. X)
- 5 Sympathetic trunk
- 6 Optic nerve (n. II) and ophthalmic artery
- 7 Oculomotor nerve (n. III)
- 8 Internal carotid artery and cavernous sinus
- 9 Sphenoidal sinus
- 10 Nerve of the pterygoid canal
- 11 Pterygopalatine ganglion
- 12 Descending palatine artery
- 13 Lateral inferior posterior nasal branches and lateral posterior nasal and septal arteries
- 14 Greater palatine nerves and artery
- 15 Lesser palatine nerves and arteries
- 16 Branches of ascending pharyngeal artery
- 17 Lingual artery
- 18 Epiglottis
- 19 Anterior ethmoidal artery
- 20 Olfactory bulb
- 21 Olfactory tract
- 22 Nasopalatine nerve
- 23 Choanae
- 24 Frontal sinus
- 25 Crista galli
- 26 Anterior ethmoidal artery and nerve, and nasal branch of anterior ethmoidal artery



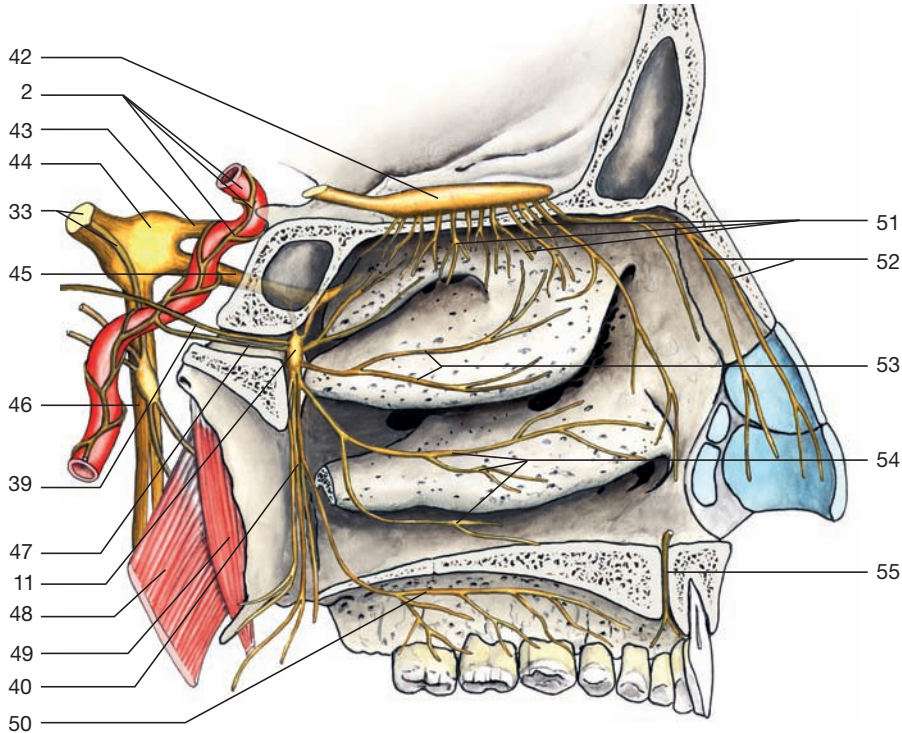
Nasal septum. Dissection of nerves and vessels.

- 27 Nasal septum
- 28 Septal artery
- 29 Crest of nasal septum
- 30 Hard palate
- 31 Cerebellar tentorium
- 32 Trochlear nerve (n. IV)
- 33 Trigeminal nerve (n. V) with motor root
- 34 Internal carotid plexus
- 35 Lingual nerve with chorda tympani
- 36 Medial pterygoid muscle and medial pterygoid plate
- 37 Inferior alveolar nerve
- 38 Sympathetic trunk
- 39 Greater petrosal nerve
- 40 Palatine nerves
- 41 Tongue
- 42 Olfactory bulb
- 43 Ophthalmic nerve (n. V₁)
- 44 Trigeminal ganglion

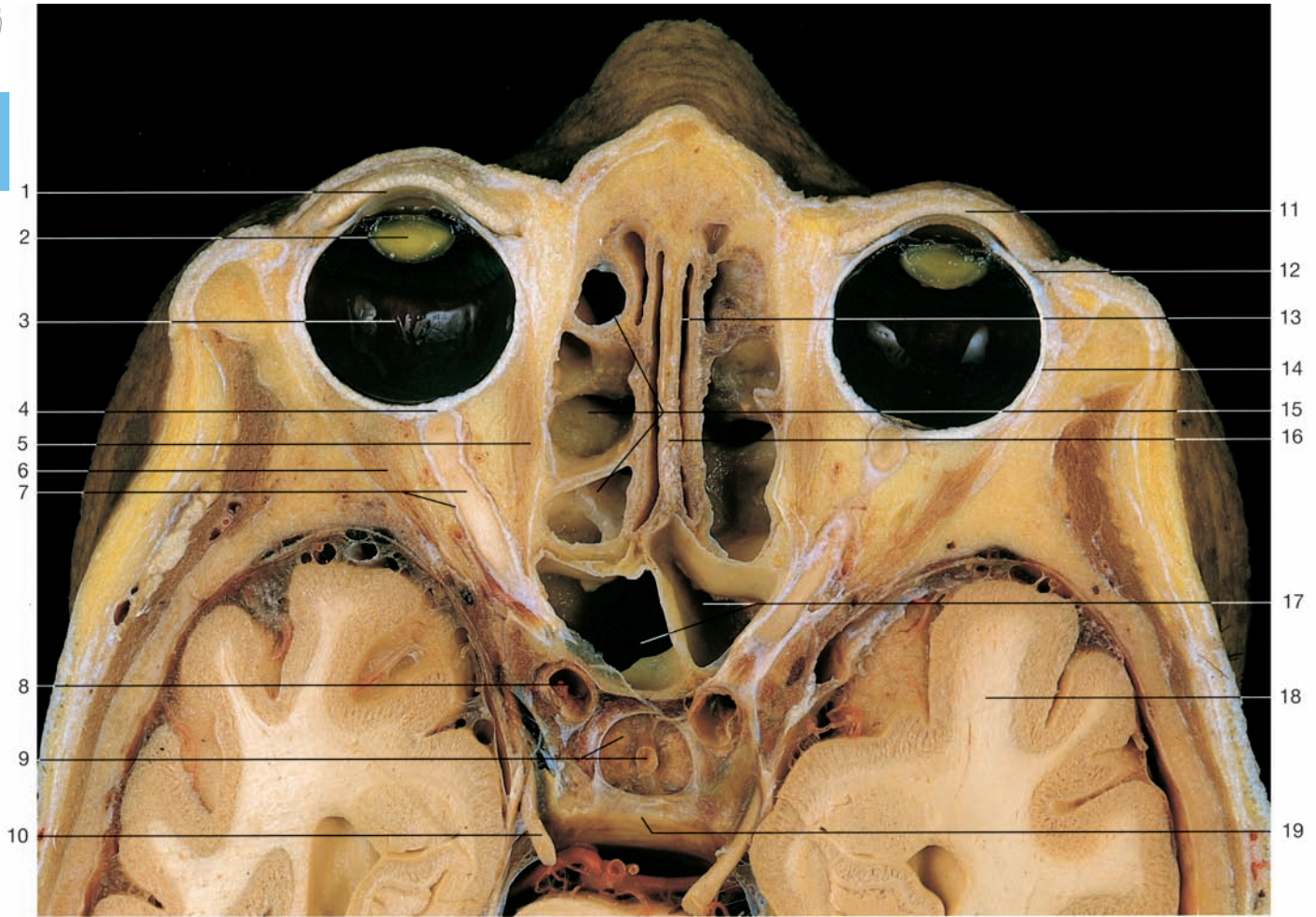


- 45 Maxillary nerve (n. V₂)
- 46 Mandibular nerve (n. V₃)
- 24 47 Deep petrosal nerve
- 48 Medial pterygoid muscle
- 49 Tensor veli palatine muscle
- 9 50 Greater palatine nerve
- 51 Olfactory nerves
- 11 52 Internal and medial nasal branches of anterior ethmoidal nerve
- 40 53 Lateral superior posterior nasal branches
- 12 54 Lateral inferior posterior nasal branches
- 55 Incisive canal with nasopalatine nerve
- 14 56 Uvula

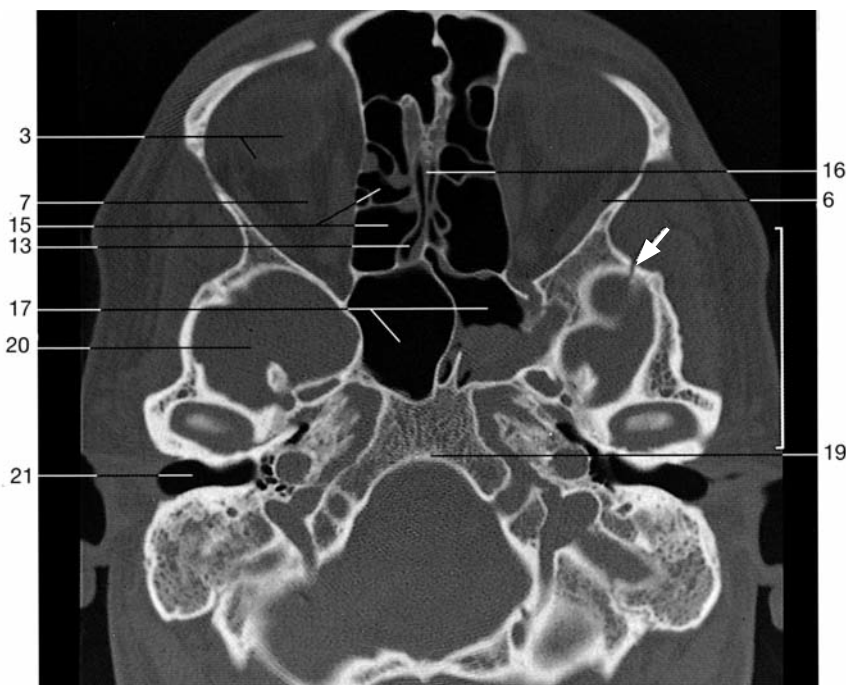
Nerves of the lateral wall of nasal cavity (sagittal section through the head). Carotid canal opened, mucous membranes of pharynx and nasal cavity partly removed.



Nerves of the lateral wall of nasal cavity (sagittal section).



Horizontal section through the nasal cavity, the orbits, and temporal lobes of the brain at the level of pituitary gland.

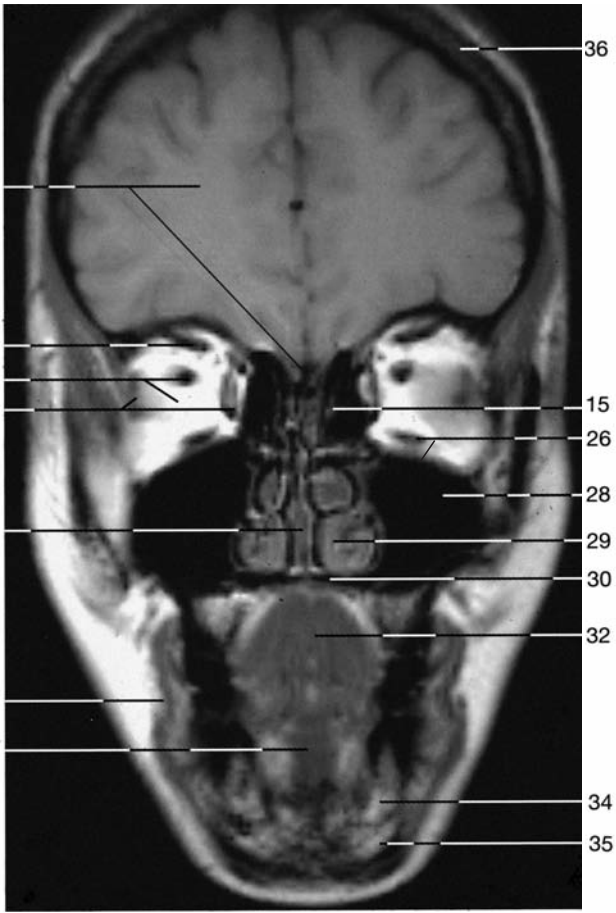


Horizontal section through the nasal cavity, the orbits, and temporal lobes of the brain (CT scan). Bar = 2 cm. Arrow: fracture.

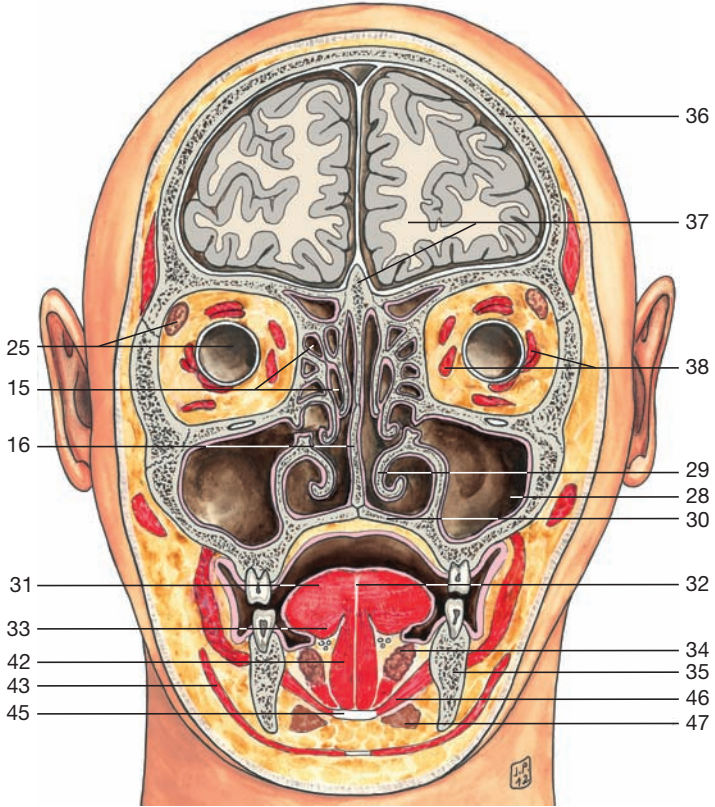
- 1 Cornea
- 2 Lens
- 3 Vitreous body (eyeball)
- 4 Head of optic nerve
- 5 Medial rectus muscle
- 6 Lateral rectus muscle
- 7 Optic nerve with dural sheath
- 8 Internal carotid artery
- 9 Pituitary gland and infundibulum
- 10 Oculomotor nerve
- 11 Superior tarsal plate of eyelid
- 12 Fornix of conjunctiva
- 13 Nasal cavity
- 14 Sclera
- 15 Ethmoidal sinus
- 16 Nasal septum
- 17 Sphenoidal sinus
- 18 Temporal lobe
- 19 Clivus
- 20 Middle cranial fossa
- 21 External acoustic meatus
- 22 Superior sagittal sinus
- 23 Falx cerebri
- 24 Superior rectus and levator palpebrae superioris muscles
- 25 Eyeball and lacrimal gland
- 26 Inferior rectus and inferior oblique muscles
- 27 Zygomatic bone
- 28 Maxillary sinus
- 29 Inferior nasal concha
- 30 Hard palate



Coronal section through the head at the level of the second pre-molar of the mandible.



Coronal section through the head (MRI scan). (Prof. Heuck, Munich, Germany.) Note the situation of the head cavities.



- 31 Superior longitudinal muscle of tongue
- 32 Lingual septum
- 33 Inferior longitudinal muscle of tongue
- 34 Sublingual gland
- 35 Mandible
- 36 Calvaria
- 37 Frontal lobe of brain and crista galli
- 38 Lateral and medial rectus muscles
- 39 Buccinator muscle
- 40 Vertical and transverse muscles of tongue
- 41 Second premolar of the mandible
- 42 Genioglossus muscle
- 43 Platysma muscle
- 44 Orbit and optic nerve (n. II)
- 45 Hyoid bone
- 46 Mylohyoid muscle
- 47 Submandibular gland

◁ Coronal section through the head at the level of the second premolar of the mandible.



- 1 Nasal cavity
- 2 Hard palate
- 3 Upper lip and orbicularis oris muscle
- 4 Vestibule of oral cavity
- 5 First incisor
- 6 Lower lip and orbicularis oris muscle
- 7 Mandible
- 8 Genioglossus muscle
- 9 Geniohyoid muscle
- 10 Anterior belly of digastric muscle
- 11 Mylohyoid muscle
- 12 Hyoid bone
- 13 Nasopharynx
- 14 Soft palate and uvula
- 15 Oropharynx
- 16 Root of tongue and lingual tonsil
- 17 Laryngopharynx
- 18 Epiglottis
- 19 Ary-epiglottic fold
- 20 Laryngopharynx continuous with esophagus
- 21 Larynx

Median sagittal section through the oral cavity and pharynx.

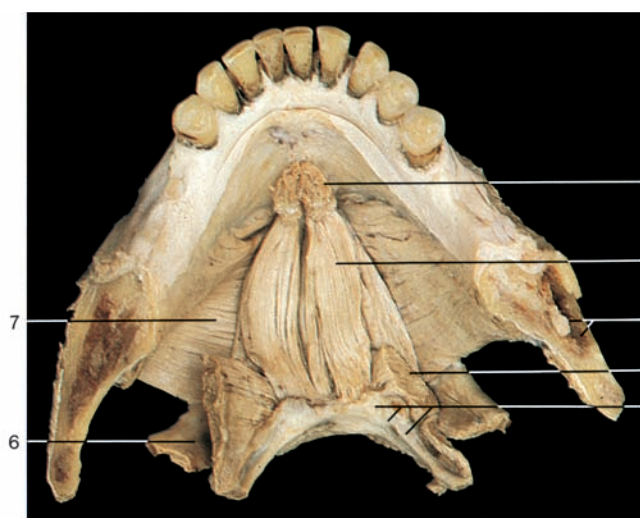


Hyoid bone (oblique-lateral aspect).



Hyoid bone (anterior aspect).

- 1 Greater cornu
 - 2 Lesser cornu
 - 3 Body
- } of hyoid bone



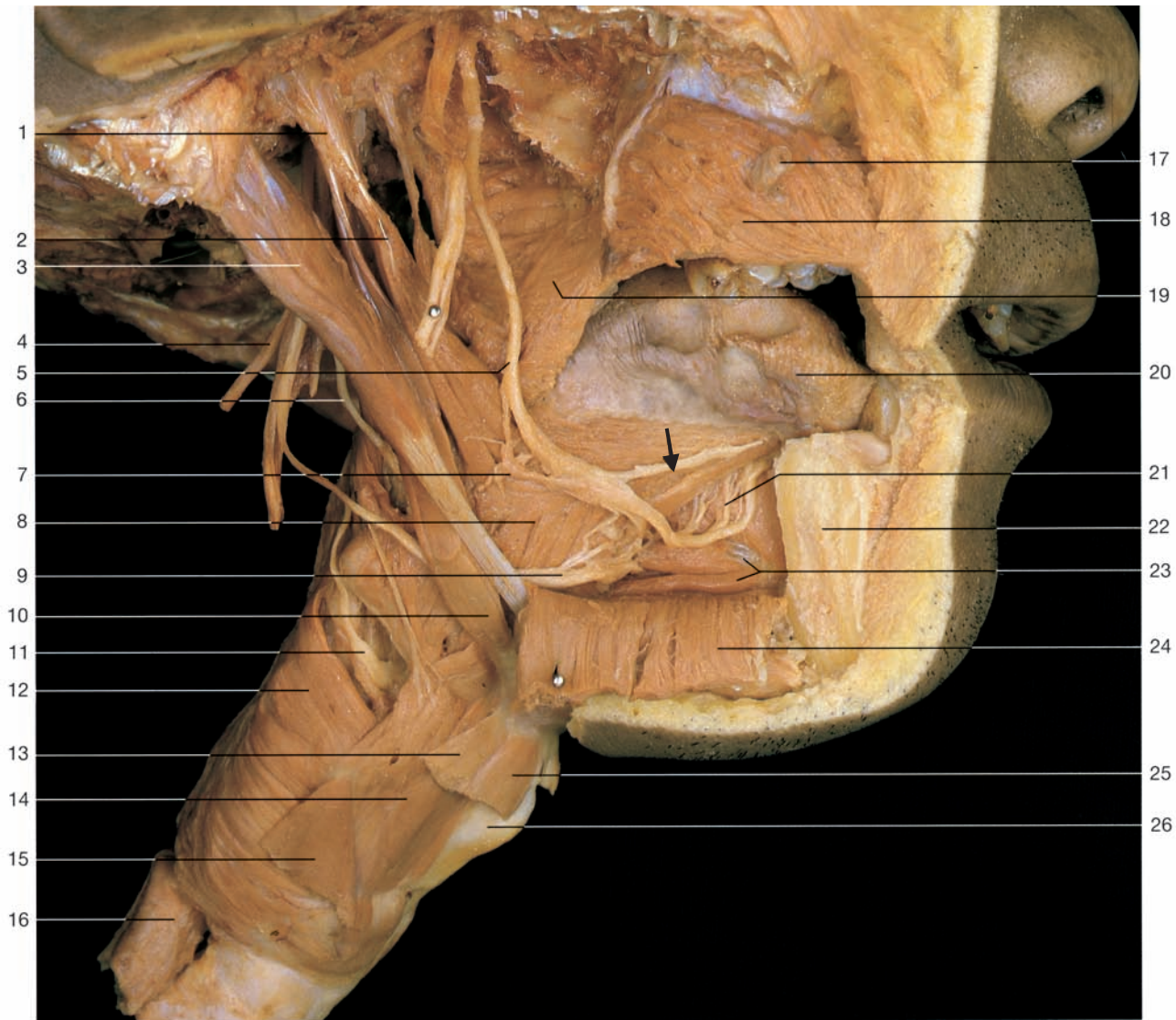
Muscles of the floor of the oral cavity (superior aspect).

- 1 Lesser cornu and body of hyoid bone
- 2 Hyoglossus muscle (divided)
- 3 Ramus of mandible and inferior alveolar nerve
- 4 Geniohyoid muscle
- 5 Genioglossus muscle (divided)
- 6 Stylohyoid muscle (divided)

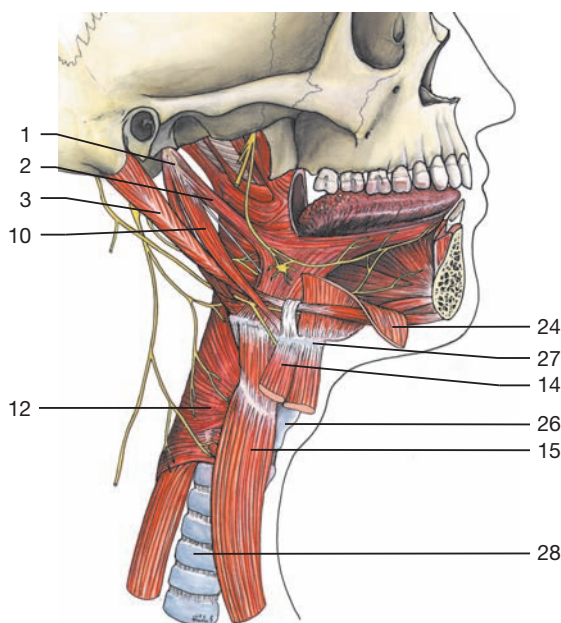


Muscles of the floor of the oral cavity (inferior aspect). Cut on the base.

- 7 Mylohyoid muscle
- 8 Anterior belly of digastric muscle
- 9 Hyoid bone
- 10 Mandible
- 11 Intermediate tendon of digastric muscle

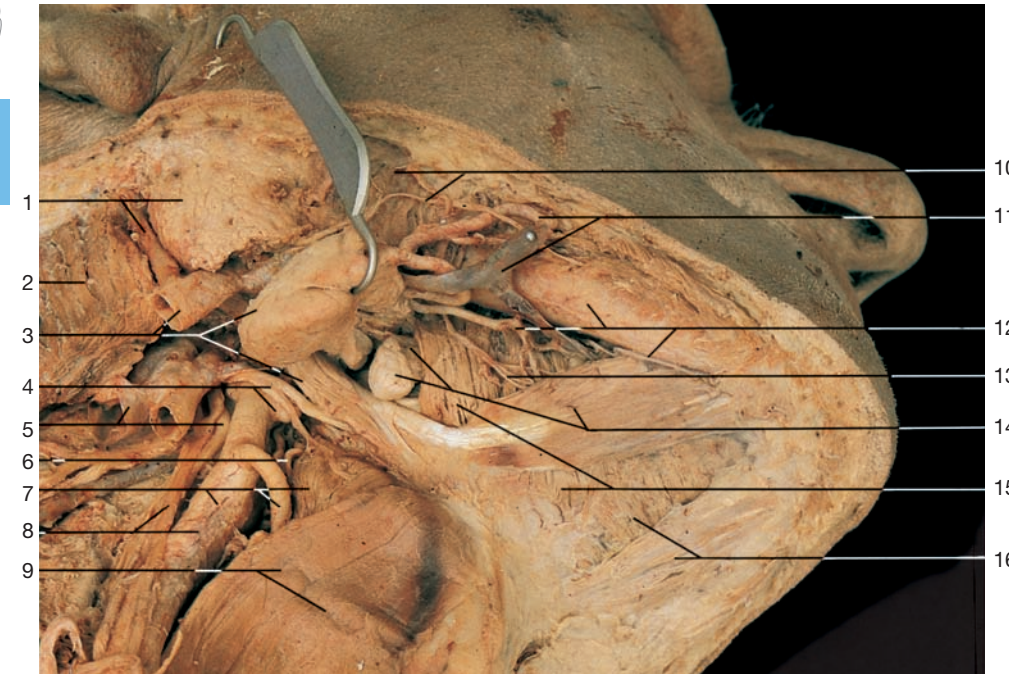


Parapharyngeal and sublingual regions. Innervation of the tongue. Lateral part of face and mandible removed, oral cavity opened. Arrow: submandibular duct.



- | | |
|---|---|
| 1 Styloid process | 14 Thyrohyoid muscle |
| 2 Styloglossus muscle | 15 Sternohyoid muscle |
| 3 Posterior belly of digastric muscle | 16 Esophagus |
| 4 Vagus nerve (n. X) | 17 Parotid duct (divided) |
| 5 Lingual nerve (n. V ₃) | 18 Buccinator muscle |
| 6 Glossopharyngeal nerve (n. IX) | 19 Superior constrictor muscle of pharynx |
| 7 Submandibular ganglion | 20 Tongue |
| 8 Hyoglossus muscle | 21 Terminal branches of lingual nerve |
| 9 Hypoglossal nerve (n. XII) | 22 Mandible (divided) |
| 10 Stylohyoid muscle | 23 Genioglossus and geniohyoid muscles |
| 11 Internal branch of superior laryngeal nerve (branch of vagus nerve, not visible) | 24 Mylohyoid muscle (divided and reflected) |
| 12 Middle constrictor muscle of pharynx | 25 Sternohyoid muscle (divided) |
| 13 Omohyoid muscle (divided) | 26 Thyroid cartilage |
| | 27 Hyoid bone |
| | 28 Trachea |

Supra- and infrahyoid muscles and pharynx.

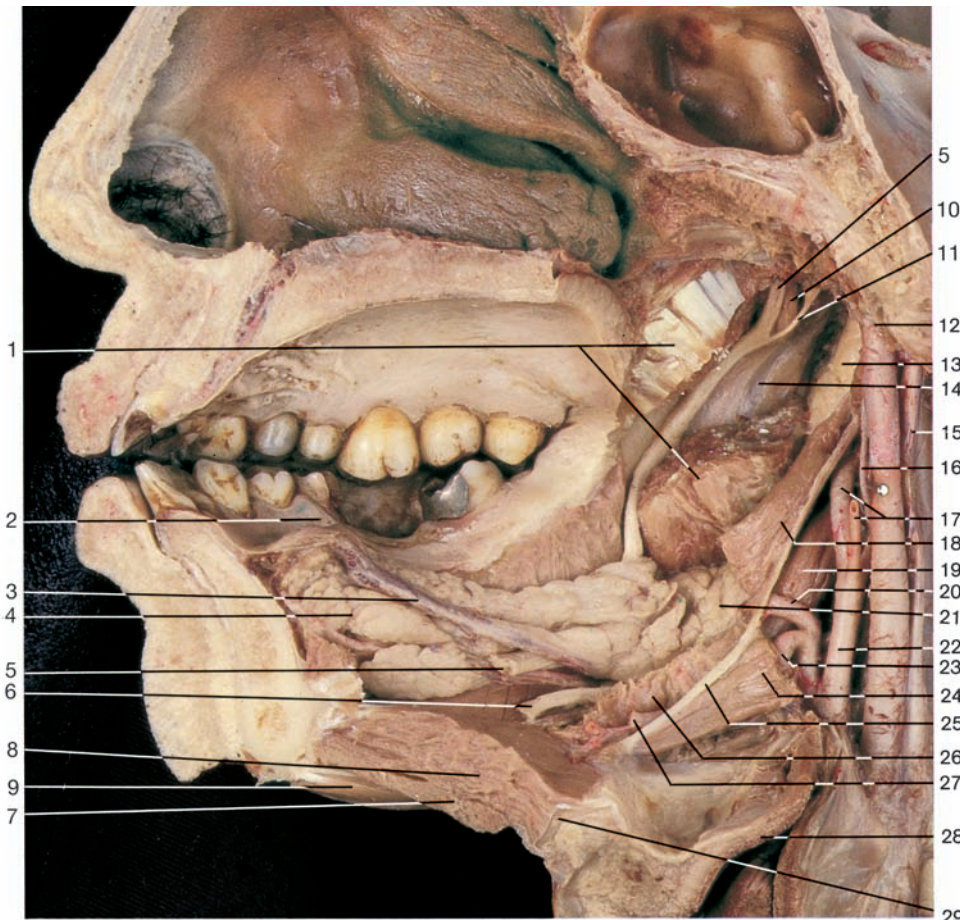


Submandibular triangle, superficial dissection. Right side (inferior aspect). Submandibular gland has been reflected.

- 1 Parotid gland and retromandibular vein
- 2 Sternocleidomastoid muscle
- 3 Retromandibular vein, submandibular gland, and stylohyoid muscle
- 4 Hypoglossal nerve and lingual artery
- 5 Vagus nerve and internal jugular vein
- 6 Superior laryngeal artery
- 7 External carotid artery, thyrohyoid muscle, and superior thyroid artery
- 8 Common carotid artery and superior root of ansa cervicalis
- 9 Omohyoid and sternohyoid muscles
- 10 Masseter muscle and marginal mandibular branch of facial nerve
- 11 Facial artery and vein
- 12 Mandible and submental artery and vein
- 13 Mylohyoid nerve
- 14 Submandibular duct, sublingual gland, and anterior belly of digastric muscle
- 15 Mylohyoid muscle
- 16 Mylohyoid muscle and anterior belly of left digastric muscle
- 17 Hyoglossus muscle and lingual artery
- 18 Lingual nerve
- 19 Hypoglossal nerve
- 20 Geniohyoid muscle
- 21 Anterior belly of right digastric muscle
- 22 Submandibular gland and duct

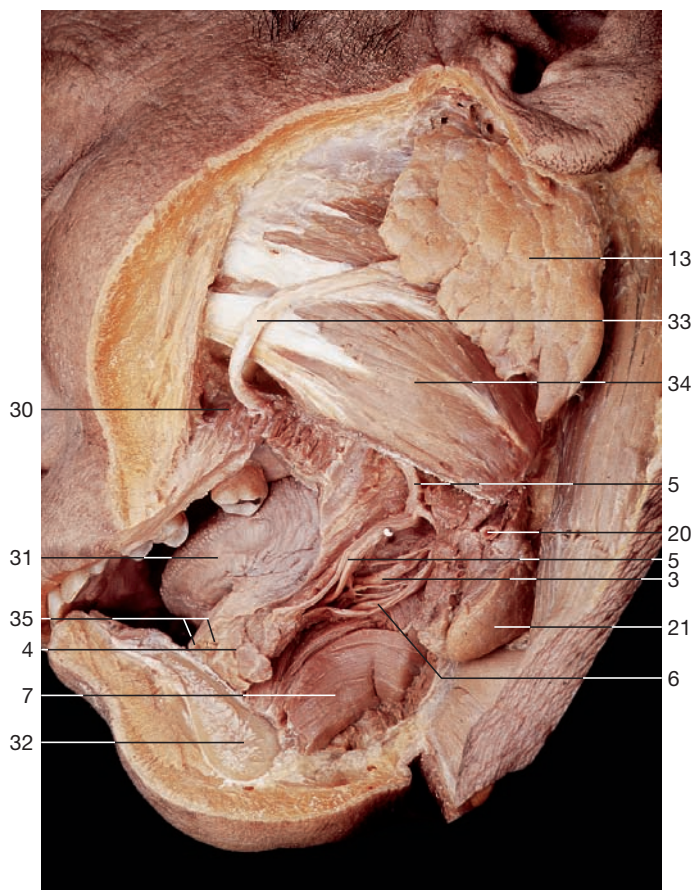


Submandibular triangle, deep dissection. Right side (inferior aspect). Mylohyoid muscle has been severed and reflected to display the lingual and hypoglossal nerves.

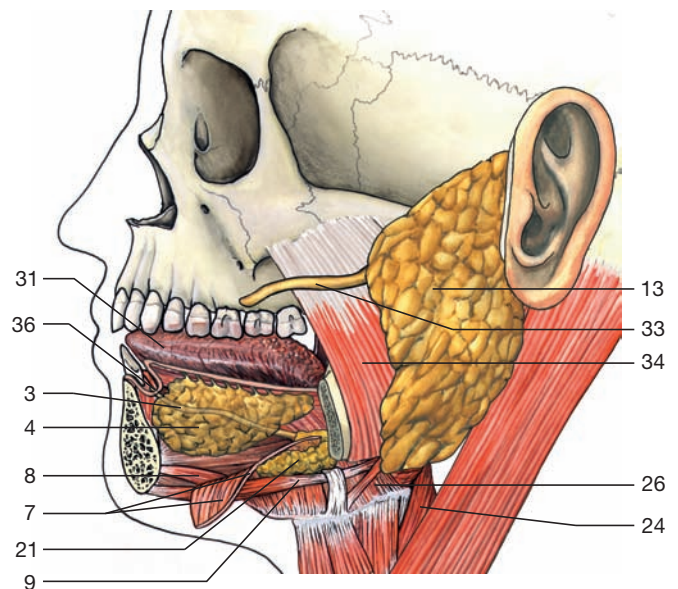


Oral cavity (internal aspect). Tongue and pharyngeal wall removed.

- 1 Medial pterygoid muscle
- 2 Sublingual papilla
- 3 Submandibular duct
- 4 Sublingual gland
- 5 Lingual nerve
- 6 Hypoglossal nerve
- 7 Mylohyoid muscle
- 8 Geniohyoid muscle
- 9 Anterior belly of digastric muscle
- 10 Inferior alveolar nerve
- 11 Chorda tympani
- 12 Internal carotid artery
- 13 Parotid gland
- 14 Sphenomandibular ligament
- 15 Vagus nerve
- 16 Glossopharyngeal nerve
- 17 Superficial temporal artery and ascending pharyngeal artery
- 18 Styloglossus muscle
- 19 Posterior belly of digastric muscle
- 20 Facial artery
- 21 Submandibular gland
- 22 External carotid artery
- 23 Lingual artery
- 24 Middle pharyngeal constrictor muscle
- 25 Stylohyoid ligament
- 26 Hyoglossus muscle
- 27 Deep lingual artery
- 28 Epiglottis
- 29 Hyoid bone
- 30 Buccinator muscle
- 31 Tongue
- 32 Mandible (divided)
- 33 Parotid duct
- 34 Masseter muscle
- 35 Right and left sublingual caruncle
- 36 Left sublingual caruncle



Dissection of the major salivary glands (infero-lateral aspect). Left mandible and buccinator muscle partly removed to view the oral cavity.



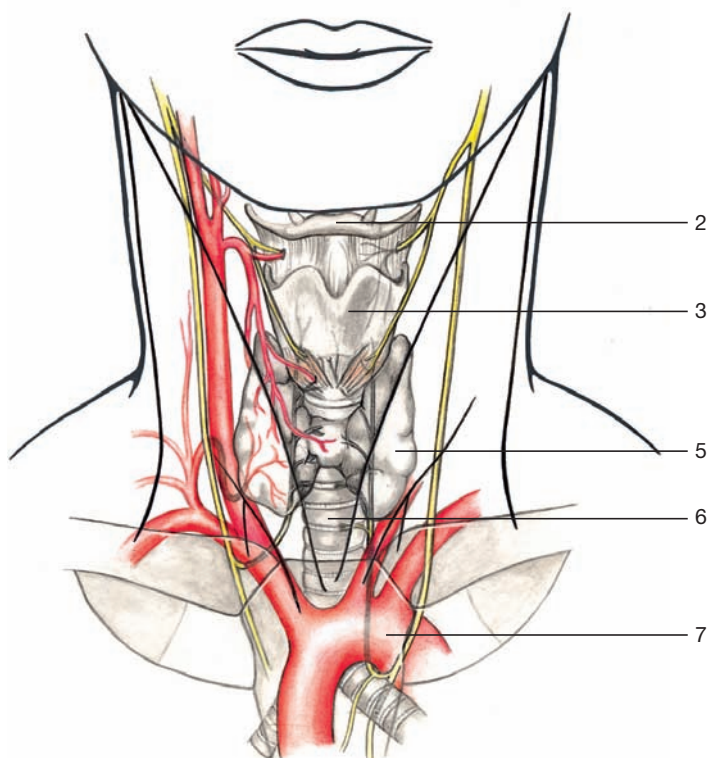
Location of the major salivary glands (lateral aspect) in relation to the oral cavity.



2.6 Neck and Organs of the Neck



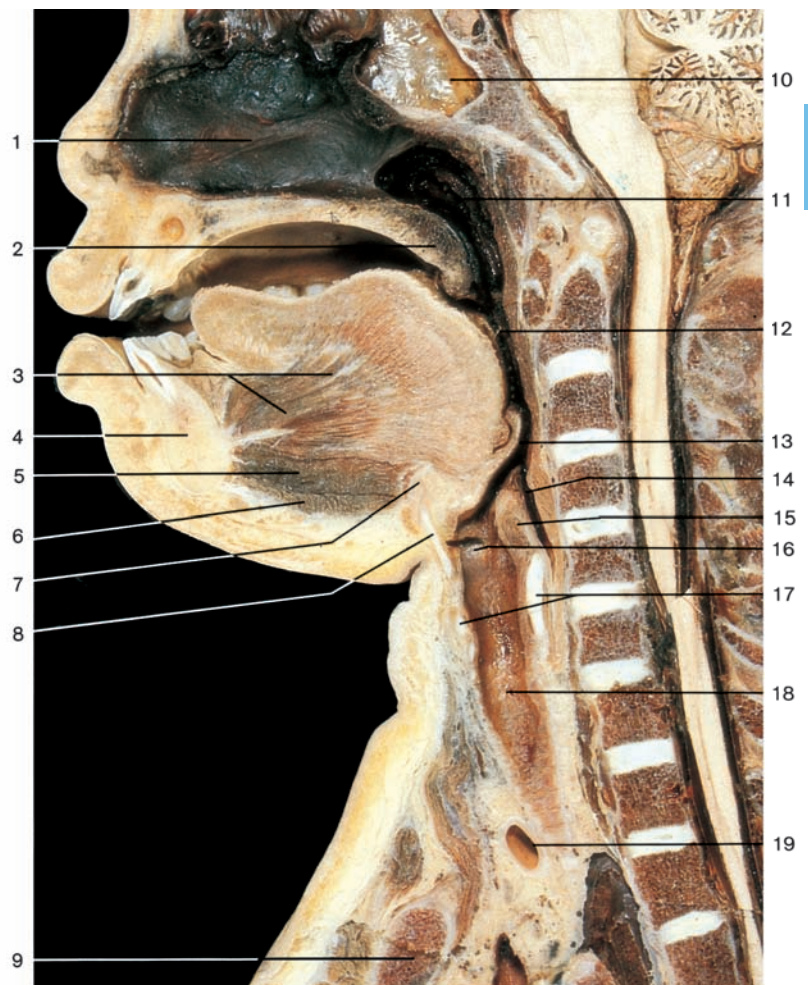
Regional anatomy of the neck (anterior aspect). The anteriorly located muscles and the thoracic wall have been removed.



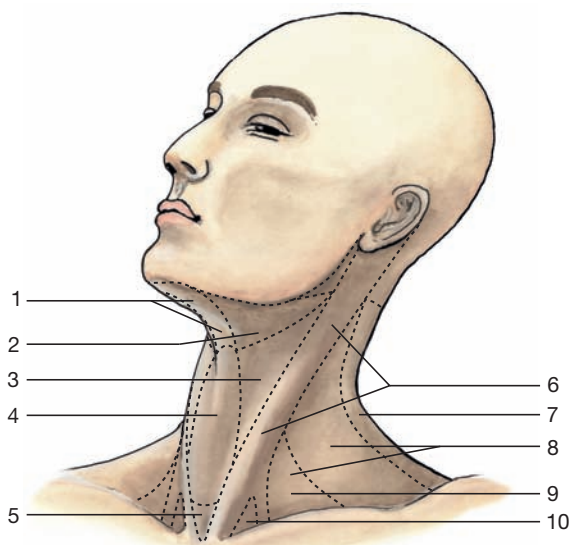
- 1 Submandibular gland
- 2 Hyoid bone
- 3 Larynx (thyroid cartilage)
- 4 Nerves and vessels of the neck (carotid artery, internal jugular vein, and vagus nerve)
- 5 Thyroid gland
- 6 Trachea
- 7 Aortic arch

Organs of the neck (anterior aspect). The main arterial trunks are indicated in red.

- 1 Nasal septum
- 2 Uvula
- 3 Genioglossus muscle
- 4 Mandible
- 5 Geniohyoid muscle
- 6 Mylohyoid muscle
- 7 Hyoid bone
- 8 Thyroid cartilage
- 9 Manubrium sterni
- 10 Sphenoidal sinus
- 11 Nasopharynx
- 12 Oropharynx
- 13 Epiglottis
- 14 Laryngopharynx
- 15 Arytenoid muscle
- 16 Vocal fold
- 17 Cricoid cartilage
- 18 Trachea
- 19 Left brachiocephalic vein
- 20 Thymus
- 21 Esophagus

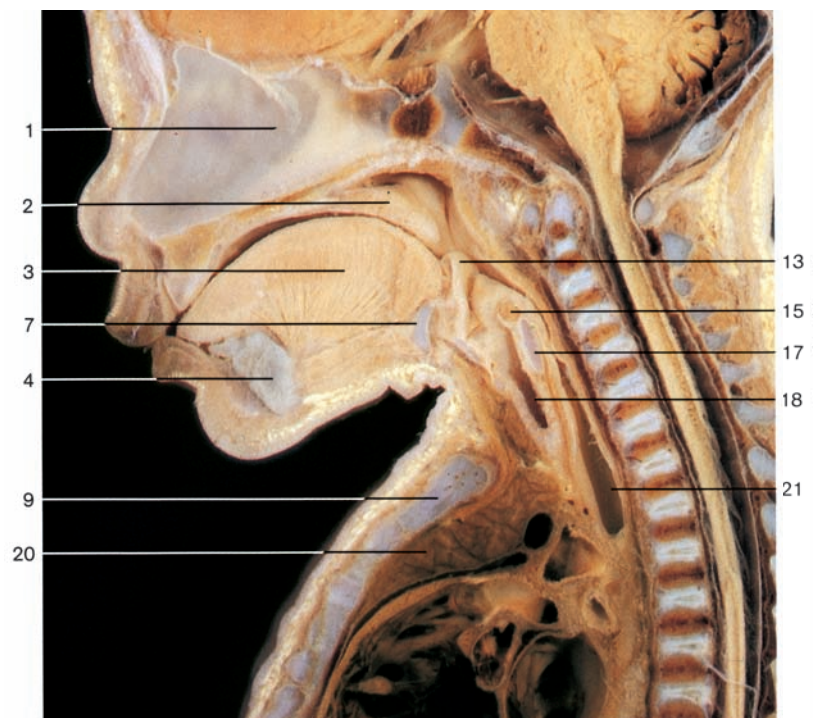


Median section through adult head and neck. Note the low position of the adult larynx when compared with that of the neonate (compare with the dissection below).

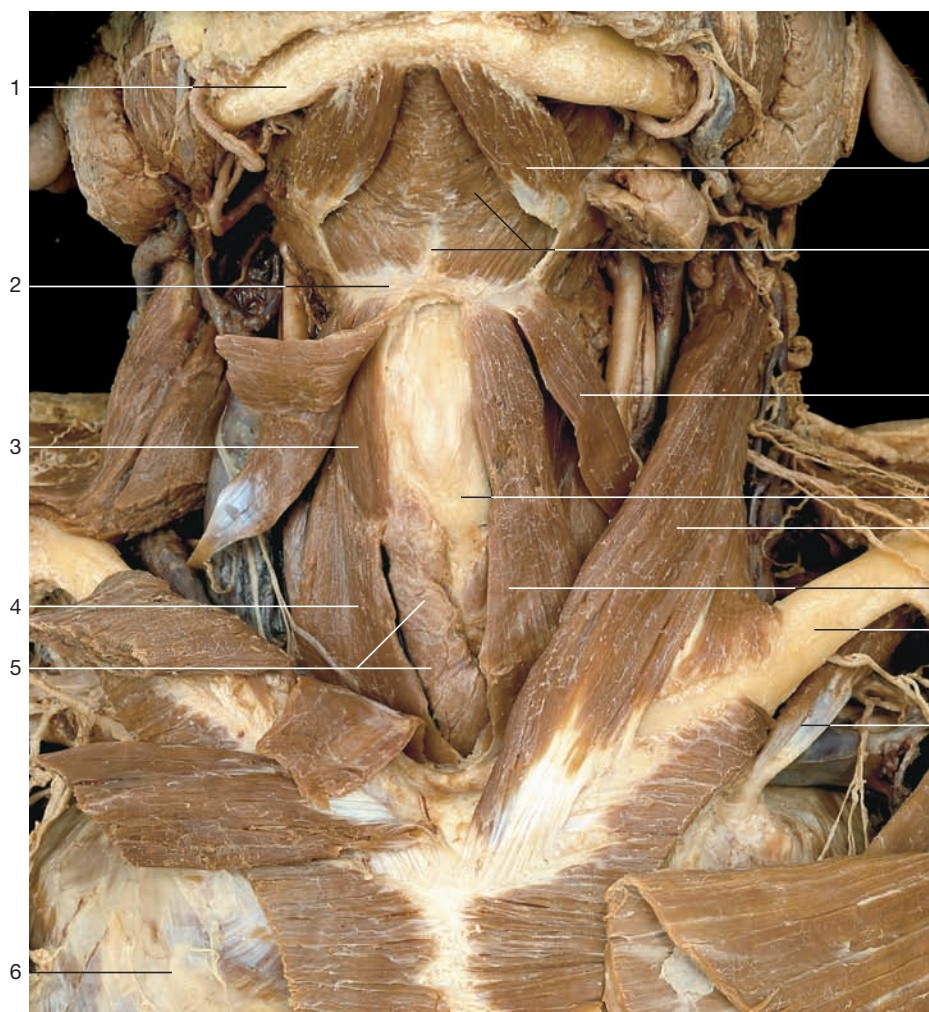


Regions and triangles of the neck (oblique-lateral aspect).

- | | |
|--|----------------------------|
| 1 Submental triangle | } Anterior cervical region |
| 2 Submandibular triangle | |
| 3 Carotid triangle | |
| 4 Muscular triangle | |
| 5 Jugular fossa | |
| 6 Sternocleidomastoid region | |
| 7 Posterior cervical region | |
| 8 Lateral cervical region | |
| 9 Greater supraclavicular fossa (supraclavicular triangle) | |
| 10 Lesser supraclavicular fossa | |

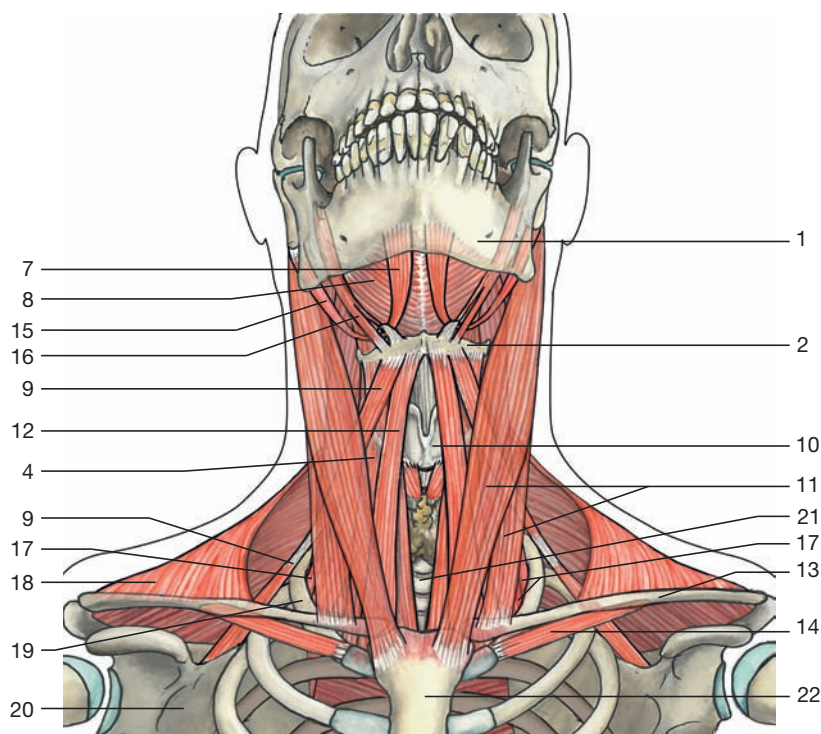


Median section through neonate head and neck. Note the high position of the larynx permitting the epiglottis to nearly reach the uvula (compare with the dissection above).



- 1 Mandible
- 2 Hyoid bone
- 3 Thyrohyoid muscle
- 4 Sternohyoid muscle
- 5 Thyroid gland
- 6 Second rib
- 7 Anterior belly of digastric muscle
- 8 Mylohyoid muscle (and mylohyoid raphe)
- 9 Omohyoid muscle
- 10 Thyroid cartilage
- 11 Sternocleidomastoid muscle
- 12 Sternohyoid muscle
- 13 Clavicle
- 14 Subclavius muscle
- 15 Posterior belly of digastric muscle
- 16 Stylohyoid muscle
- 17 Scalene muscles
- 18 Trapezius muscle
- 19 First rib
- 20 Scapula
- 21 Trachea
- 22 Manubrium sterni

Muscles of the neck (anterior aspect). Sternocleidomastoid and sternohyoid muscles on the right have been divided and reflected.

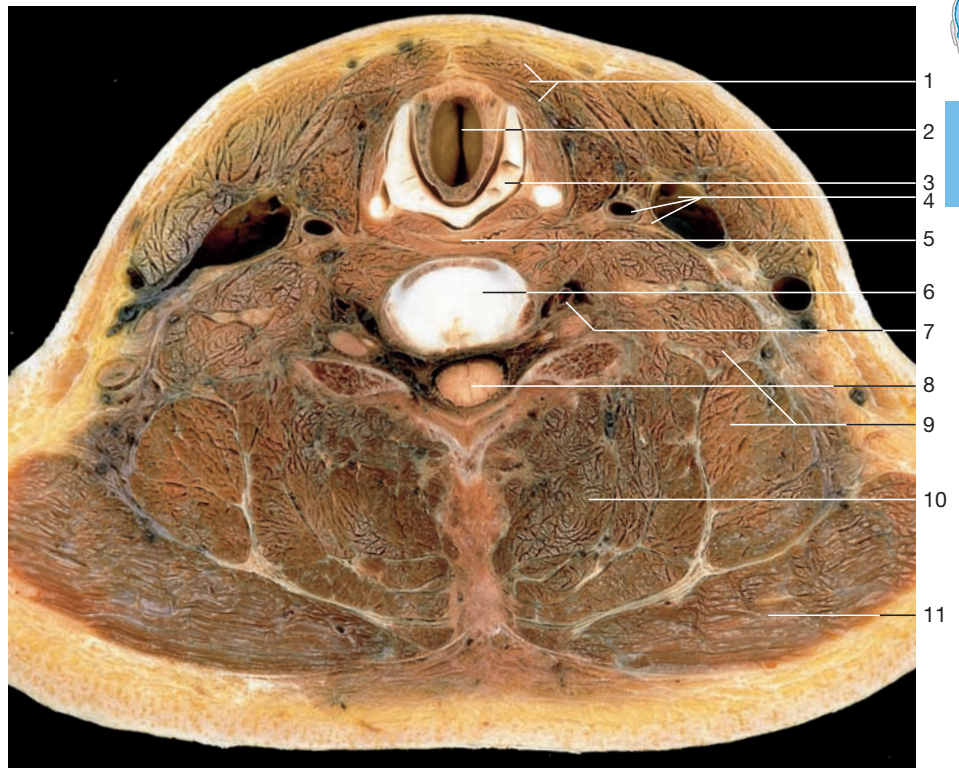


Muscles of the neck (anterior aspect).

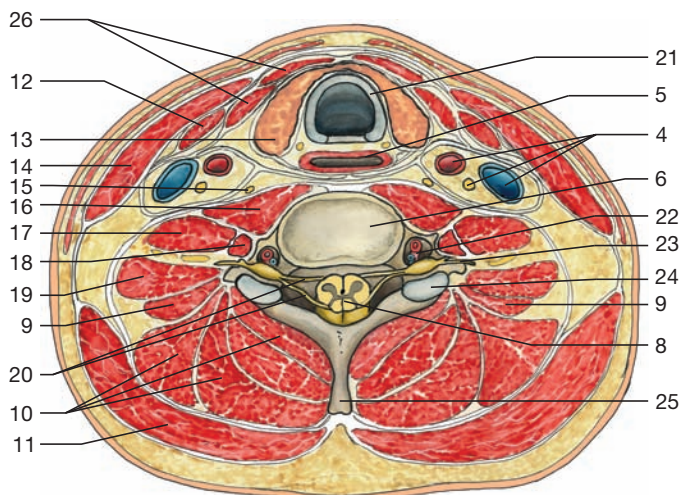
The muscles of the neck are complex and highly sophisticated. There are two major groups of muscles to be distinguished according to their functional aspects. One group is constituted by muscles connecting head to the hyoid bone and the larynx. The second category of muscles links the head and the ribcage.

The sternocleidomastoid muscle represents the border between the anterior and posterior cervical triangle.

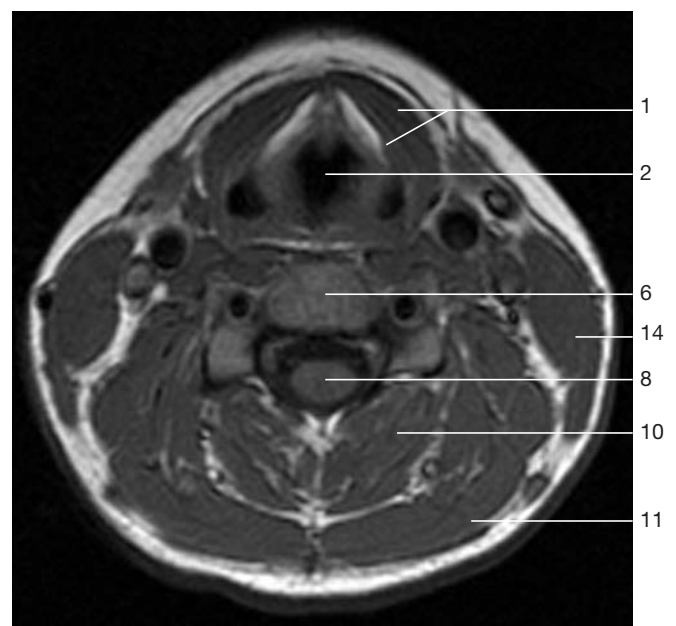
- 1 Sternohyoid and thyrohyoid muscles
- 2 Larynx
- 3 Cricoid cartilage
- 4 Internal jugular vein, common carotid artery, and vagus nerve
- 5 Esophagus
- 6 Body of cervical vertebra
- 7 Vertebral artery
- 8 Spinal cord
- 9 Posterior scalene muscle
- 10 Deep muscles of the neck
- 11 Trapezius muscle
- 12 Omohyoid muscle
- 13 Thyroid gland
- 14 Sternocleidomastoid muscle
- 15 Sympathetic trunk
- 16 Longus colli muscle
- 17 Anterior scalene muscle
- 18 Longissimus capitis muscle
- 19 Middle scalene muscle
- 20 Ventral and dorsal root of cervical spinal nerve
- 21 Trachea
- 22 Vertebral artery and vein, and foramen transversarium
- 23 Cervical spinal nerve
- 24 Superior facet of articular process
- 25 Spinous process
- 26 Sternohyoid and sternothyroid muscles



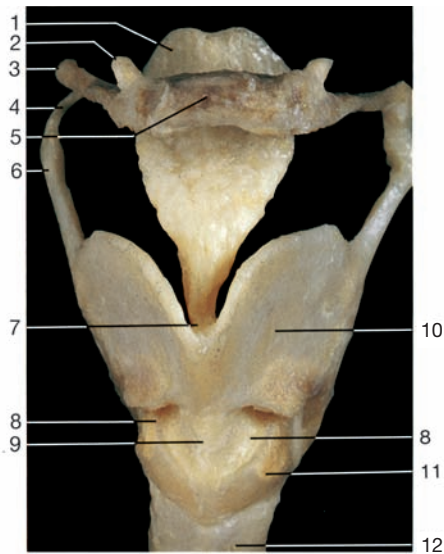
Axial section through the neck at the level of the intervertebral disc between the fifth and sixth cervical vertebrae (inferior aspect).



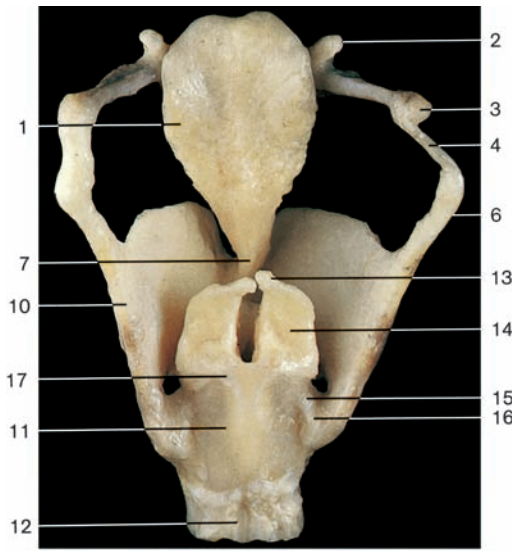
Organization of the neck (axial section at the level of the thyroid gland).



Axial section through the neck at the level of the fourth cervical vertebra (MRI scan). (From Heuck et al., MRT-Atlas, 2009.)

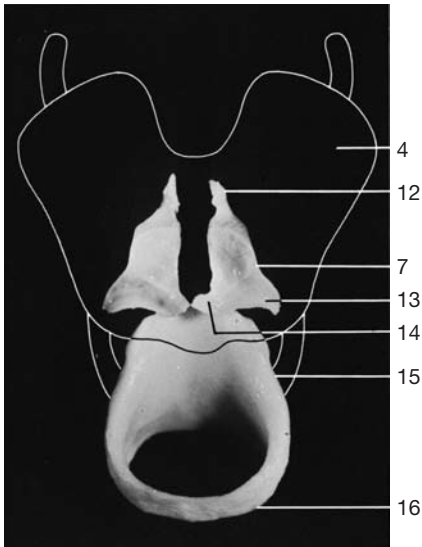


Cartilages of the larynx and the hyoid bone (anterior aspect).

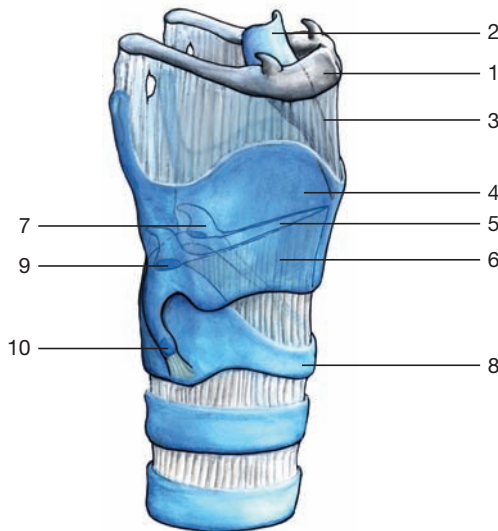


Cartilages of the larynx and the hyoid bone (posterior aspect).

- 1 Epiglottis
- 2 Lesser cornu of hyoid bone
- 3 Greater cornu of hyoid bone
- 4 Lateral thyrohyoid ligament
- 5 Body of hyoid bone
- 6 Superior cornu of thyroid cartilage
- 7 Thyro-epiglottic ligament
- 8 Conus elasticus
- 9 Cricothyroid ligament
- 10 Thyroid cartilage
- 11 Cricoid cartilage
- 12 Trachea
- 13 Corniculate cartilage
- 14 Arytenoid cartilage
- 15 Posterior crico-arytenoid ligament
- 16 Cricothyroid joint
- 17 Crico-arytenoid joint

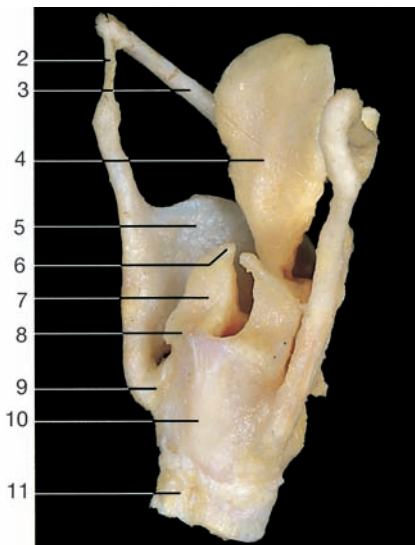


Cartilages of the larynx (anterior aspect). Thyroid cartilage is indicated by the outline.

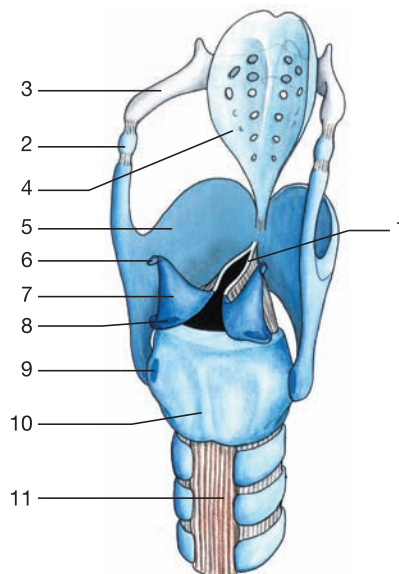


Cartilages and ligaments of the larynx (lateral aspect).

- 1 Hyoid bone
- 2 Epiglottis
- 3 Thyrohyoid membrane
- 4 Thyroid cartilage
- 5 Vocal ligament
- 6 Conus elasticus
- 7 Arytenoid cartilage
- 8 Cricoid cartilage
- 9 Crico-arytenoid joint
- 10 Cricothyroid joint
- 11 Tracheal cartilages
- 12 Corniculate cartilage
- 13 Muscular process of arytenoid cartilage
- 14 Vocal process of arytenoid cartilage
- 15 Lamina of cricoid cartilage
- 16 Arch of cricoid cartilage

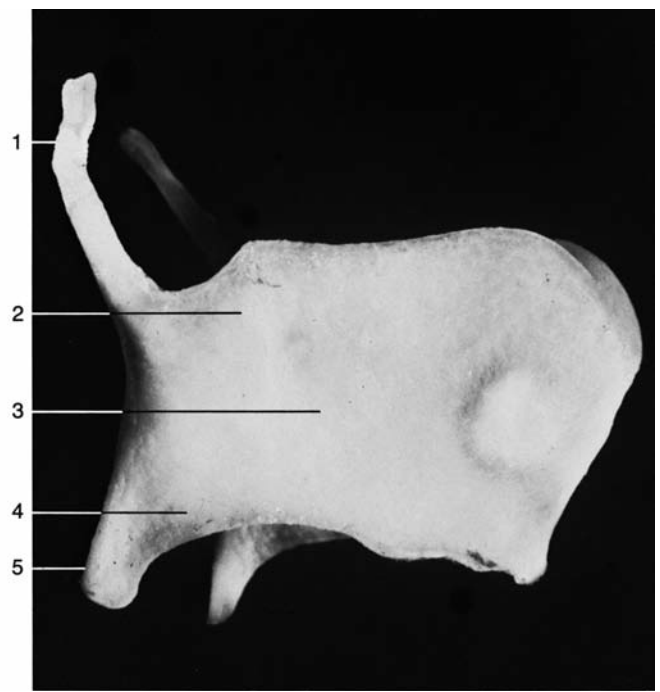


Cartilages of the larynx (oblique-posterior aspect).



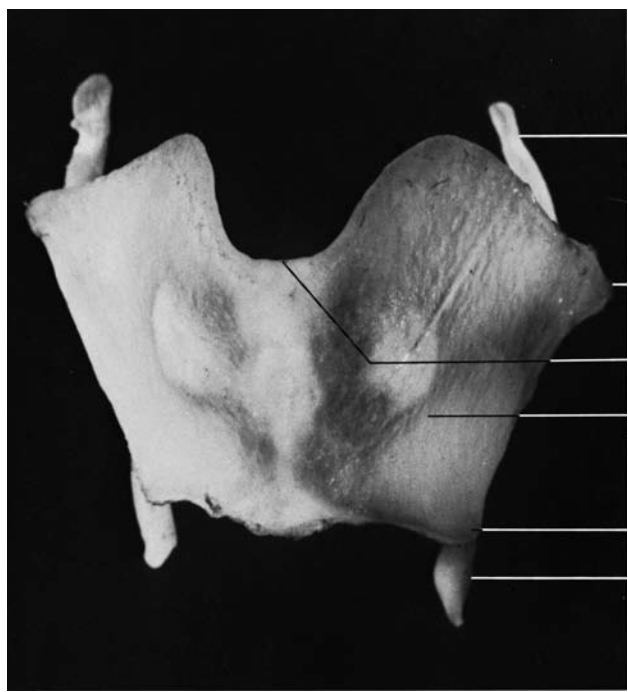
Cartilages of the larynx (oblique-posterior aspect).

- 1 Vocal ligament
- 2 Lateral thyrohyoid ligament
- 3 Greater cornu of hyoid bone
- 4 Epiglottis
- 5 Thyroid cartilage
- 6 Corniculate cartilage
- 7 Arytenoid cartilage
- 8 Crico-arytenoid joint
- 9 Cricothyroid joint
- 10 Cricoid cartilage
- 11 Trachea



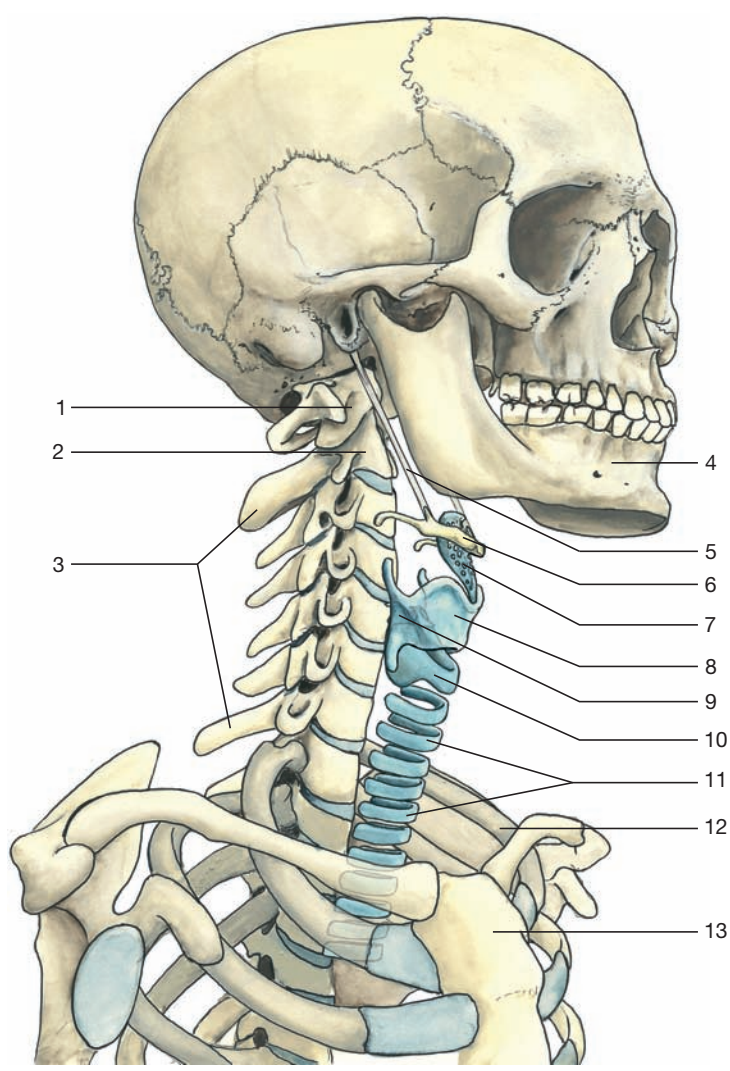
Thyroid cartilage (lateral aspect).

- 1 Superior cornu
- 2 Superior thyroid tubercle
- 3 Lamina of thyroid cartilage



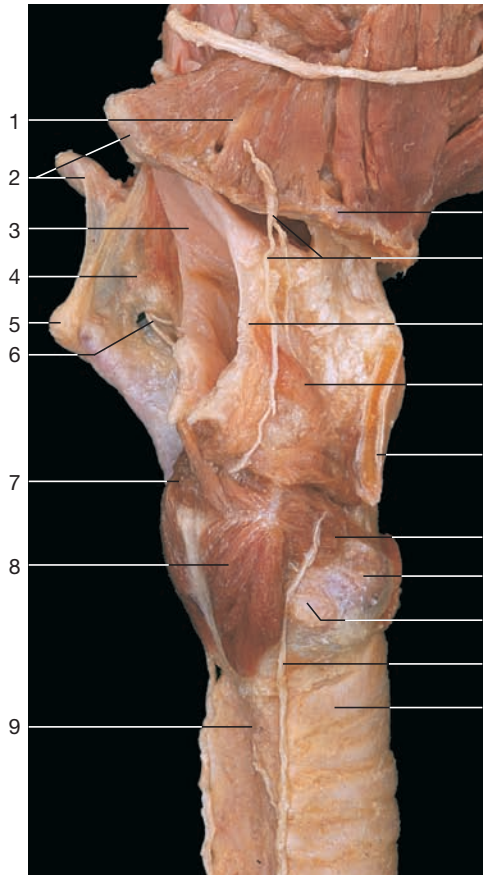
Thyroid cartilage (anterior aspect).

- 4 Inferior thyroid tubercle
- 5 Inferior cornu
- 6 Superior thyroid notch



- 1 Atlas
- 2 Axis
- 3 Cervical vertebrae II–VII
- 4 Mandible
- 5 Stylohyoid ligament
- 6 Hyoid bone
- 7 Epiglottis
- 8 Thyroid cartilage
- 9 Arytenoid cartilage
- 10 Cricoid cartilage
- 11 Tracheal cartilages
- 12 First rib
- 13 Manubrium of sternum

Position of the larynx and hyoid bone in the neck (oblique-lateral aspect).

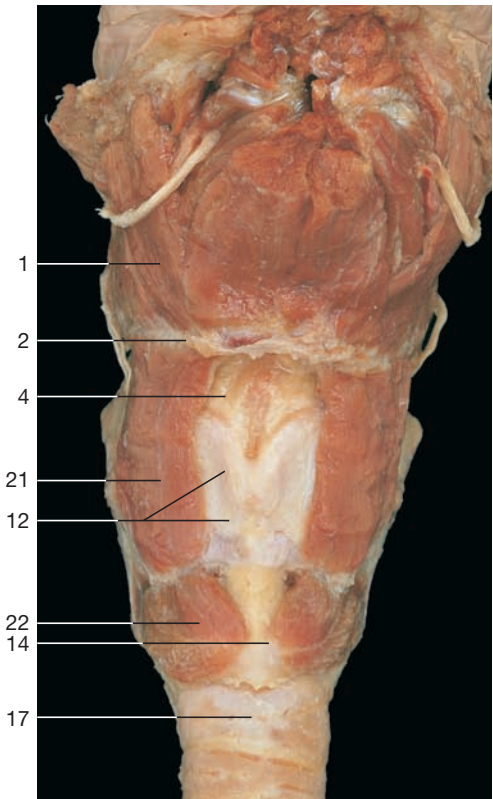


Laryngeal muscles (lateral aspect).
Thyroid cartilage and thyro-arytenoid muscle have been partly removed.

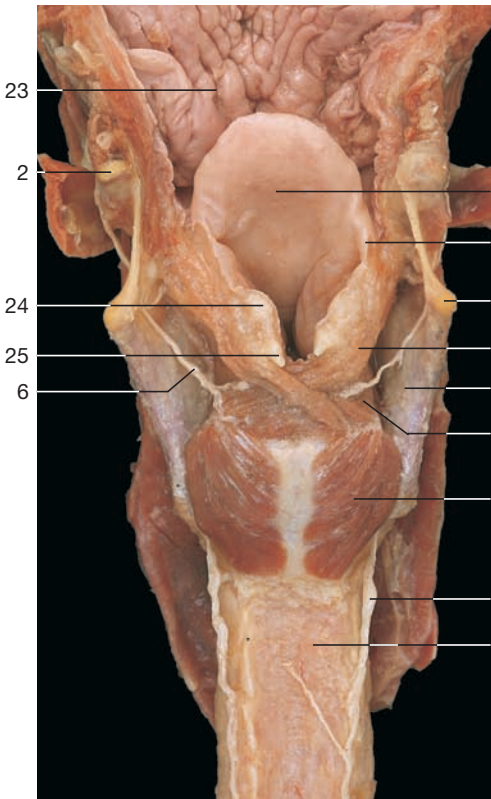


Laryngeal muscles (lateral aspect).
Half of the thyroid cartilage has been removed. Dissection of the vocal ligament.

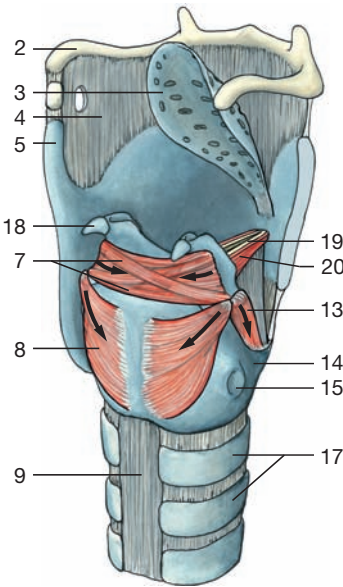
- 1 Hyoglossus muscle
- 2 Hyoid bone
- 3 Epiglottitis
- 4 Thyrohyoid membrane
- 5 Superior cornu of thyroid cartilage
- 6 Superior laryngeal nerve
- 7 Transverse arytenoid muscle
- 8 Posterior crico-arytenoid muscle
- 9 Transverse muscle of trachea
- 10 Ary-epiglottic fold
- 11 Thyro-epiglottic muscle
- 12 Thyroid cartilage
- 13 Lateral crico-arytenoid muscle
- 14 Cricoid cartilage
- 15 Articular facet for thyroid cartilage
- 16 Inferior laryngeal nerve (branch of recurrent nerve)
- 17 Trachea
- 18 Arytenoid cartilage
- 19 Vocal ligament
- 20 Vocalis muscle (part of thyro-arytenoid muscle)
- 21 Thyrohyoideus muscle
- 22 Cricothyroideus muscle
- 23 Root of tongue
- 24 Cuneiform tubercle
- 25 Corniculate tubercle
- 26 Ary-epiglottic muscle



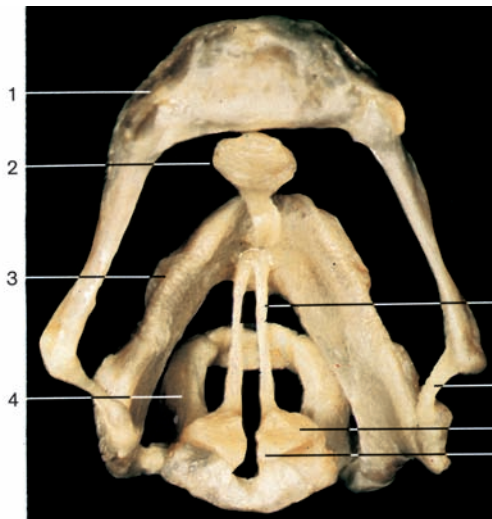
Laryngeal muscles and larynx (anterior aspect).



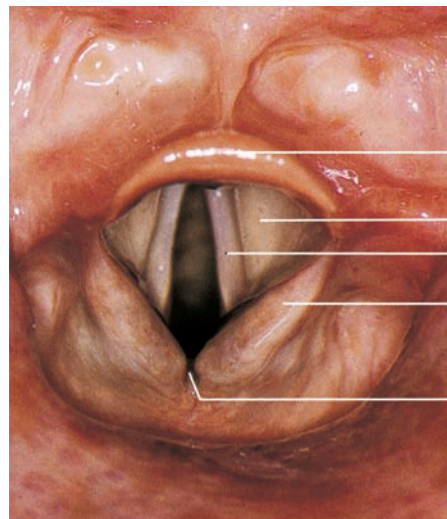
Laryngeal muscles and larynx (posterior aspect).



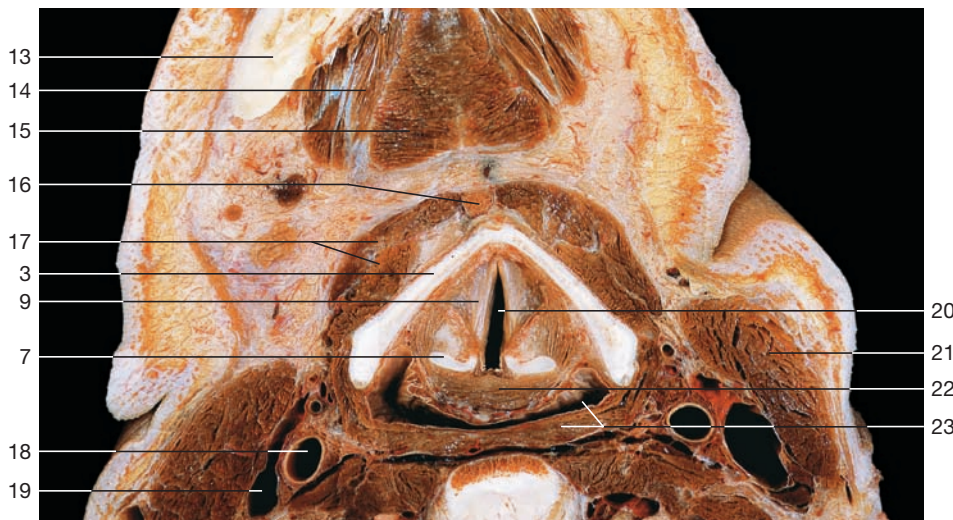
Action of internal muscles of the larynx.



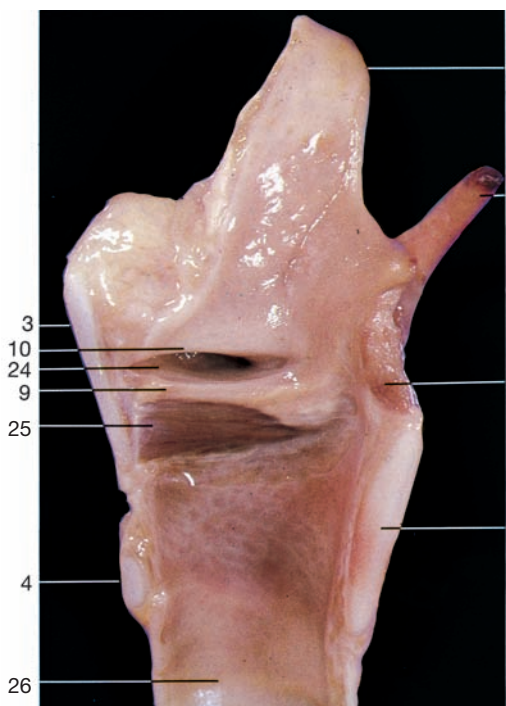
Laryngeal cartilages (superior aspect).



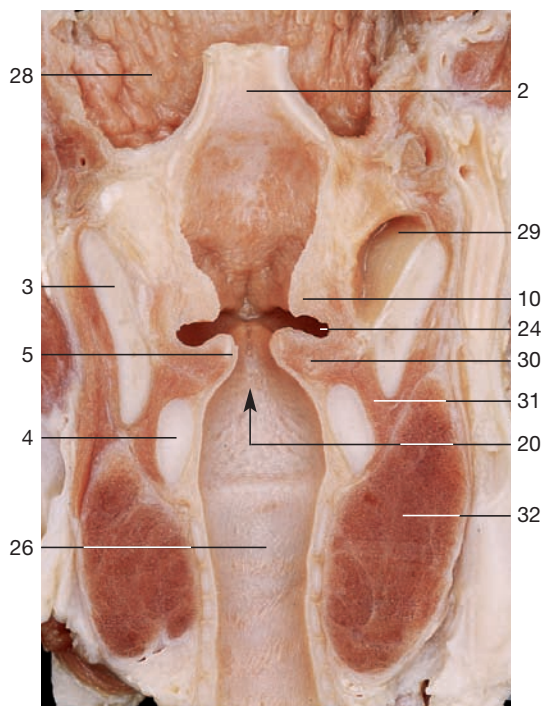
Glottis in vivo (superior aspect).



Horizontal section through the larynx at the level of the vocal folds (superior aspect).

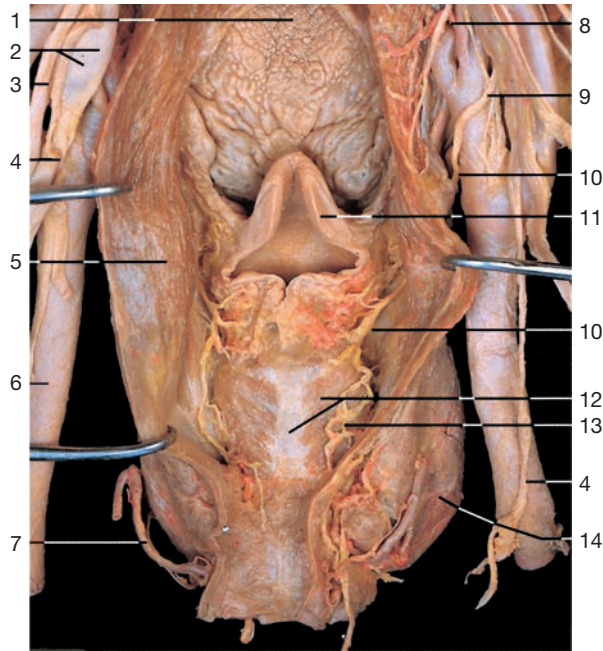


Sagittal section through larynx and trachea.

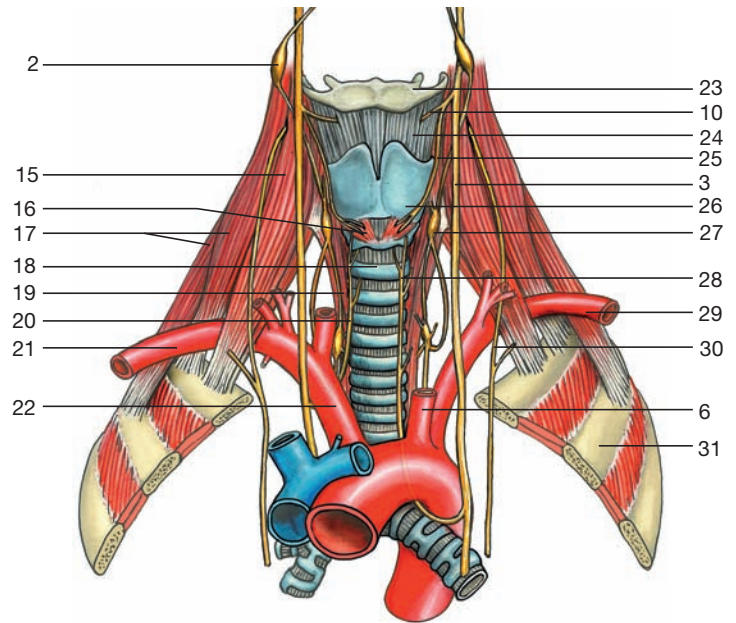


Coronal section through larynx and trachea.

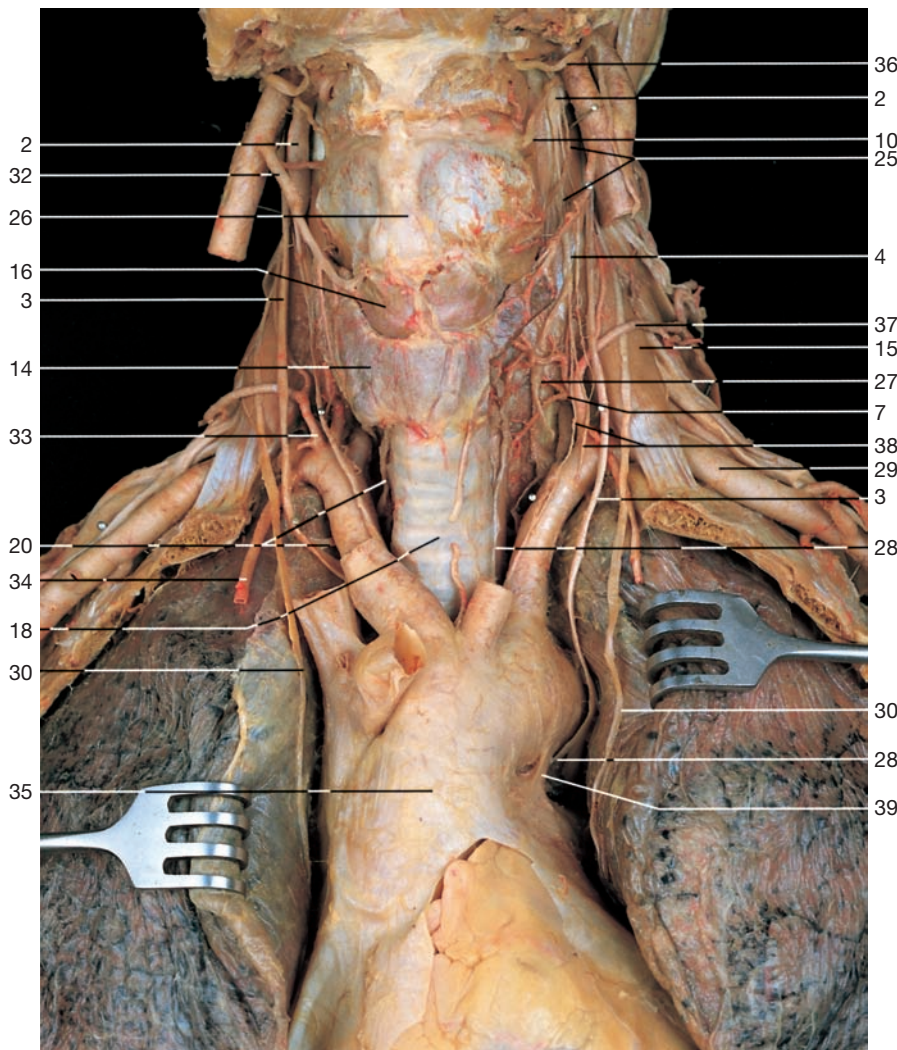
- 1 Hyoid bone
- 2 Epiglottis
- 3 Thyroid cartilage
- 4 Cricoid cartilage
- 5 Vocal ligament
- 6 Thyrohyoid ligament
- 7 Arytenoid cartilage
- 8 Corniculate cartilage
- 9 Vocal fold
- 10 Vestibular fold
- 11 Ary-epiglottic fold
- 12 Interarytenoid notch
- 13 Mandible
- 14 Anterior belly of digastric muscle
- 15 Mylohyoid muscle
- 16 Pyramidal lobe of thyroid gland
- 17 Sternohyoid and sternothyroid muscles
- 18 Common carotid artery
- 19 Internal jugular vein
- 20 Rima glottidis
- 21 Sternocleidomastoid muscle
- 22 Transverse arytenoid muscle
- 23 Pharynx and inferior constrictor muscle
- 24 Ventricle of larynx
- 25 Vocalis muscle
- 26 Trachea
- 27 Superior cornu of thyroid cartilage
- 28 Root of tongue (lingual tonsil)
- 29 Piriform recess
- 30 Vocalis muscle
- 31 Lateral crico-arytenoid muscle
- 32 Thyroid gland



Innervation of the larynx (posterior aspect).
Dissection of superior and inferior laryngeal nerves.
Pharynx has been opened.

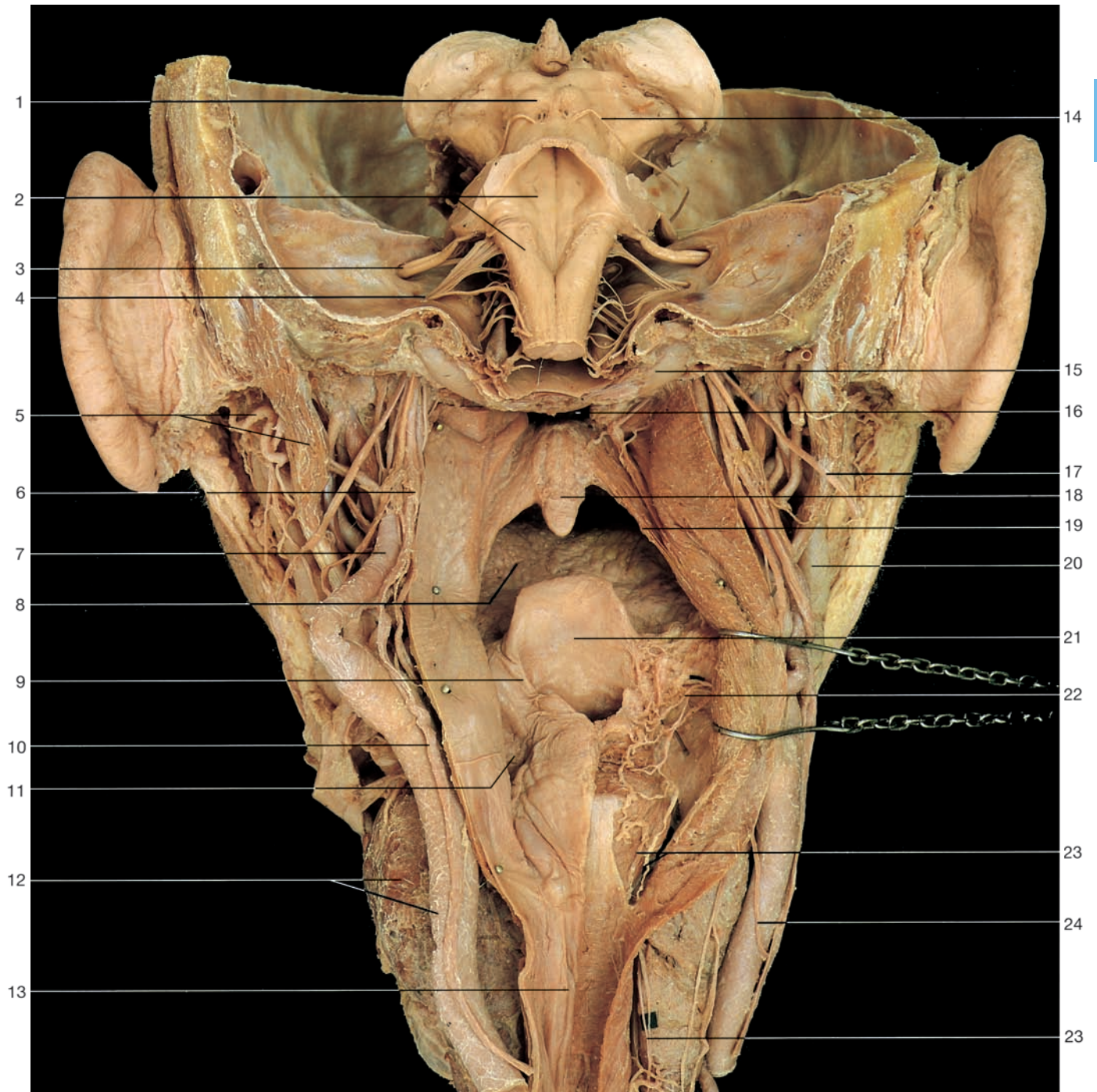


Innervation of the larynx (anterior aspect).



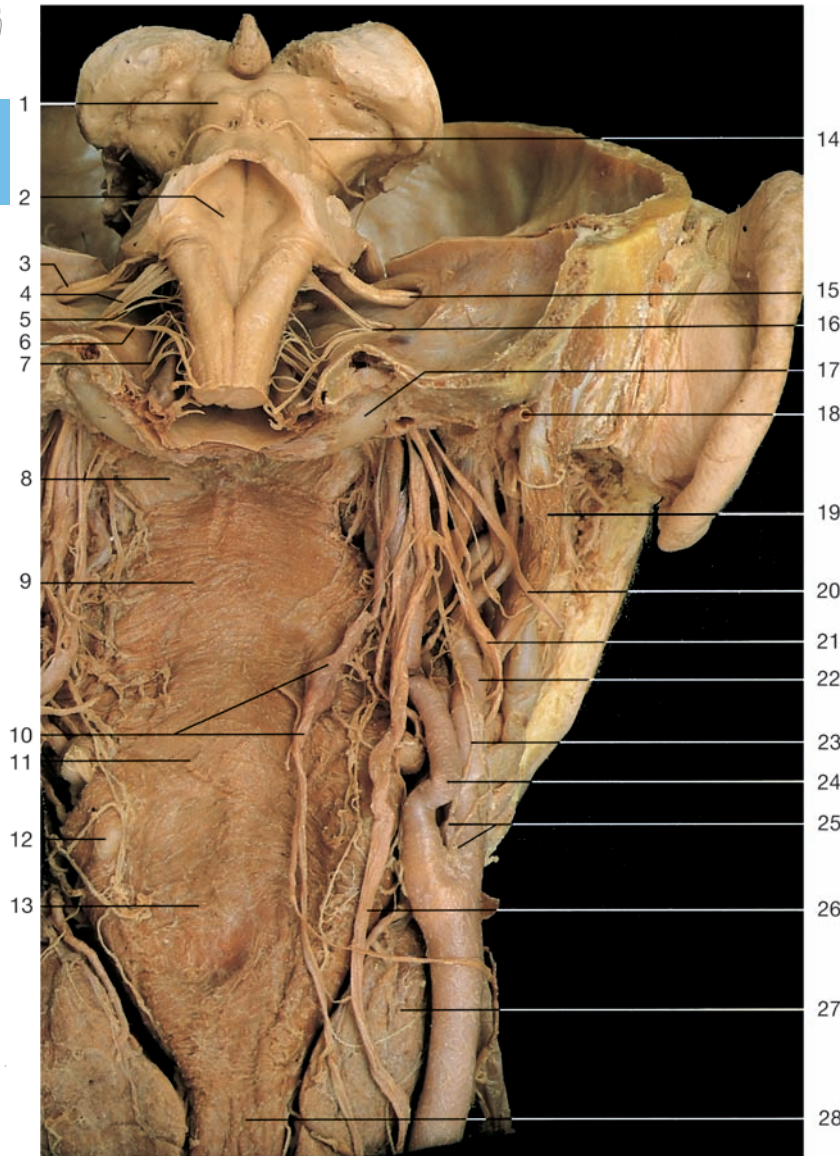
Larynx and thoracic organs (anterior aspect). Dissection of vagus and recurrent laryngeal nerves.

- 1 Tongue
- 2 Superior cervical ganglion
- 3 Vagus nerve (n. X)
- 4 Sympathetic trunk
- 5 Inferior constrictor muscle of pharynx
- 6 Left common carotid artery
- 7 Inferior thyroid artery
- 8 Glossopharyngeal nerve (n. IX)
- 9 Superior laryngeal nerve
- 10 Internal branch of superior laryngeal nerve
- 11 Epiglottis
- 12 Posterior crico-arytenoid muscle and cricoid cartilage
- 13 Recurrent laryngeal nerve
- 14 Thyroid gland
- 15 Anterior scalene muscle
- 16 Cricothyroid muscle
- 17 Middle and posterior scalene muscles
- 18 Trachea
- 19 Longus capitis muscle
- 20 Right recurrent laryngeal nerve
- 21 Right subclavian artery
- 22 Brachiocephalic trunk
- 23 Hyoid bone
- 24 Thyrohyoid membrane
- 25 External branch of superior laryngeal nerve
- 26 Thyroid cartilage
- 27 Middle cervical ganglion
- 28 Left recurrent laryngeal nerve
- 29 Left subclavian artery
- 30 Phrenic nerve
- 31 Second rib
- 32 Superior thyroid artery
- 33 Thyrocervical trunk
- 34 Internal thoracic artery
- 35 Aortic arch
- 36 Hypoglossal nerve (n. XII)
- 37 Transverse cervical artery
- 38 Inferior cervical cardiac nerves (branches of sympathetic trunk)
- 39 Ligamentum arteriosum



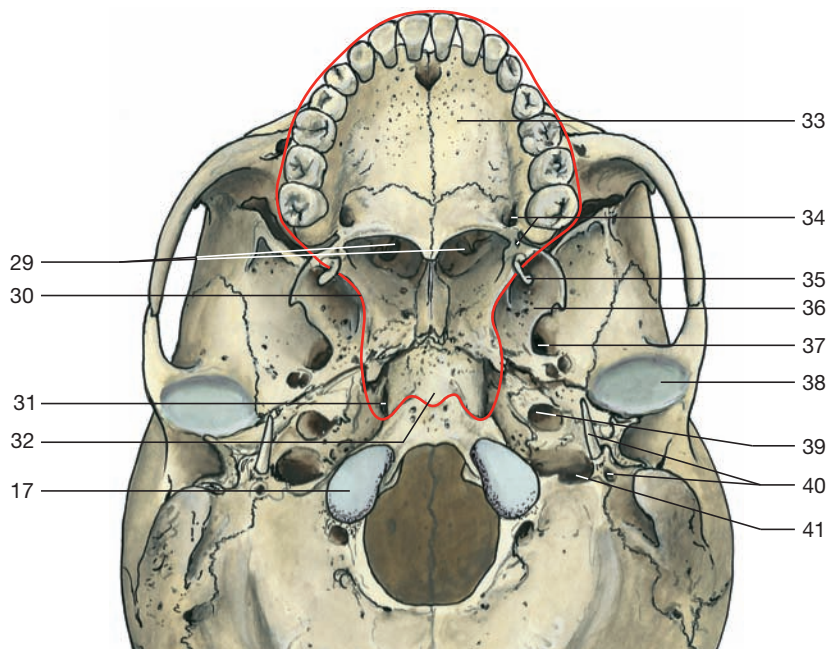
Larynx and oral cavity (posterior aspect). Mucous membrane on the right half of pharynx has been removed.

- | | | |
|--|--|--|
| 1 Midbrain (inferior colliculus) | 9 Ary-epiglottic fold | 18 Uvula and soft palate |
| 2 Rhomboid fossa and medulla oblongata | 10 Vagus nerve | 19 Palatopharyngeus muscle |
| 3 Vestibulocochlear and facial nerve | 11 Piriform recess | 20 External carotid artery |
| 4 Glossopharyngeal, vagus, and accessory nerves | 12 Thyroid gland and common carotid artery | 21 Epiglottis |
| 5 Occipital artery and posterior belly of digastric muscle | 13 Esophagus | 22 Internal branch of superior laryngeal nerve |
| 6 Superior cervical ganglion | 14 Trochlear nerve | 23 Inferior laryngeal nerve |
| 7 Internal carotid artery | 15 Occipital condyle | 24 Ansa cervicalis |
| 8 Oral cavity (tongue) | 16 Nasal cavity (choana) | |
| | 17 Accessory nerve | |



Pharynx and parapharyngeal nerves in connection with the brain stem (posterior aspect).

- 1 Inferior colliculus of midbrain
- 2 Facial colliculus in floor of rhomboid fossa
- 3 Vestibulocochlear and facial nerves
- 4 Glossopharyngeal nerve
- 5 Vagus nerve
- 6 Accessory nerve
- 7 Hypoglossal nerve
- 8 Pharyngobasilar fascia
- 9 Superior constrictor muscle of pharynx
- 10 Sympathetic trunk and superior cervical ganglion (medially displaced)
- 11 Middle constrictor muscle of pharynx
- 12 Greater cornu of hyoid bone
- 13 Inferior constrictor muscle of pharynx
- 14 Trochlear nerve
- 15 Internal acoustic meatus with facial and vestibulocochlear nerves
- 16 Jugular foramen with glossopharyngeal, vagus, and accessory nerves
- 17 Occipital condyle
- 18 Occipital artery
- 19 Posterior belly of digastric muscle
- 20 Accessory nerve (extracranial part)
- 21 Hypoglossal nerve (extracranial part)
- 22 External carotid artery
- 23 Carotid sinus nerve
- 24 Internal carotid artery
- 25 Carotid sinus and carotid body
- 26 Vagus nerve
- 27 Thyroid gland
- 28 Esophagus
- 29 Choanae
- 30 Medial pterygoid plate
- 31 Foramen lacerum
- 32 Pharyngeal tubercle
- 33 Hard palate
- 34 Greater and lesser palatine foramen
- 35 Pterygoid hamulus
- 36 Lateral pterygoid plate
- 37 Foramen ovale
- 38 Mandibular fossa
- 39 Carotid canal
- 40 Styloid process and stylomastoid foramen
- 41 Jugular foramen



Base of the skull (inferior aspect).

Red line = outline of superior constrictor muscle in continuity with buccinator and orbicularis oris muscles.

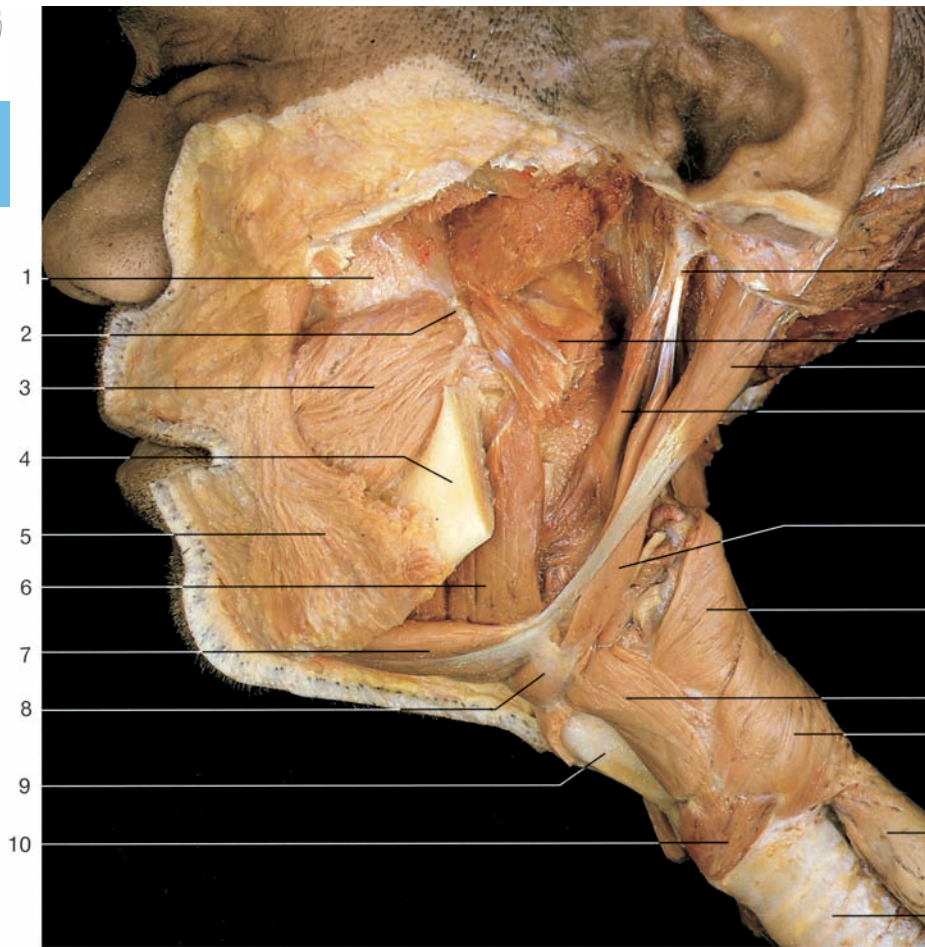


Pharynx with parapharyngeal nerves and vessels (posterior aspect).



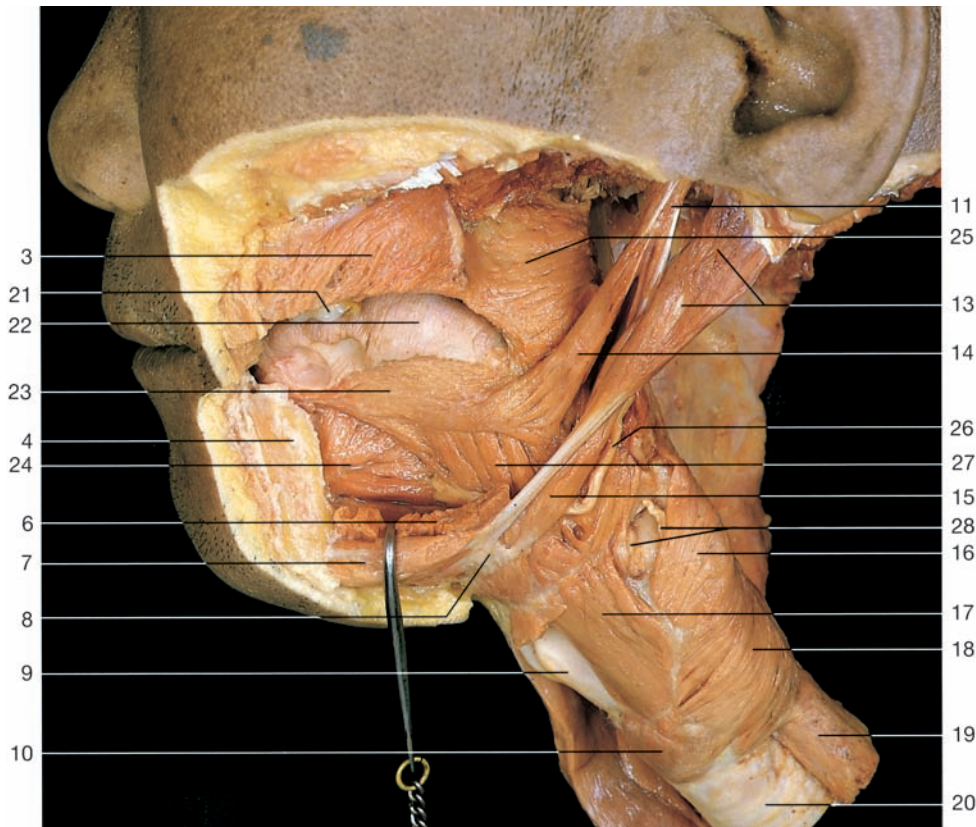
Cross section through head and neck at the level of the atlas (inferior aspect).

- 1 Ascending pharyngeal artery
- 2 Pharyngeal plexus
- 3 Accessory nerve
- 4 Superior cervical ganglion of sympathetic trunk
- 5 Superior laryngeal nerve
- 6 Carotid body and carotid sinus nerve
- 7 Left vagus nerve
- 8 Common carotid artery and cardiac branch of vagus nerve
- 9 Glossopharyngeal nerve
- 10 Hypoglossal nerve
- 11 Facial nerve
- 12 Posterior belly of digastric muscle
- 13 Middle constrictor muscle of pharynx
- 14 Right vagus nerve
- 15 Sympathetic trunk
- 16 Internal jugular vein
- 17 Inferior constrictor muscle of pharynx
- 18 Larynx
- 19 Buccinator muscle
- 20 Soft palate and palatine glands
- 21 Palatine tonsil
- 22 Uvula of palate
- 23 Pharynx (oral part)
- 24 Parotid gland
- 25 Longus capitis muscle
- 26 Median atlanto-axial joint and anterior arch of atlas
- 27 Dens of axis
- 28 Spinal cord
- 29 Dura mater
- 30 Incisive papilla
- 31 Oral vestibule
- 32 Masseter muscle
- 33 Mandible
- 34 Mandibular canal with vessels and nerve
- 35 Medial pterygoid muscle
- 36 External carotid artery
- 37 Internal carotid artery
- 38 Atlas
- 39 Vertebral artery
- 40 Splenius capitis muscle
- 41 Semispinalis capitis muscle

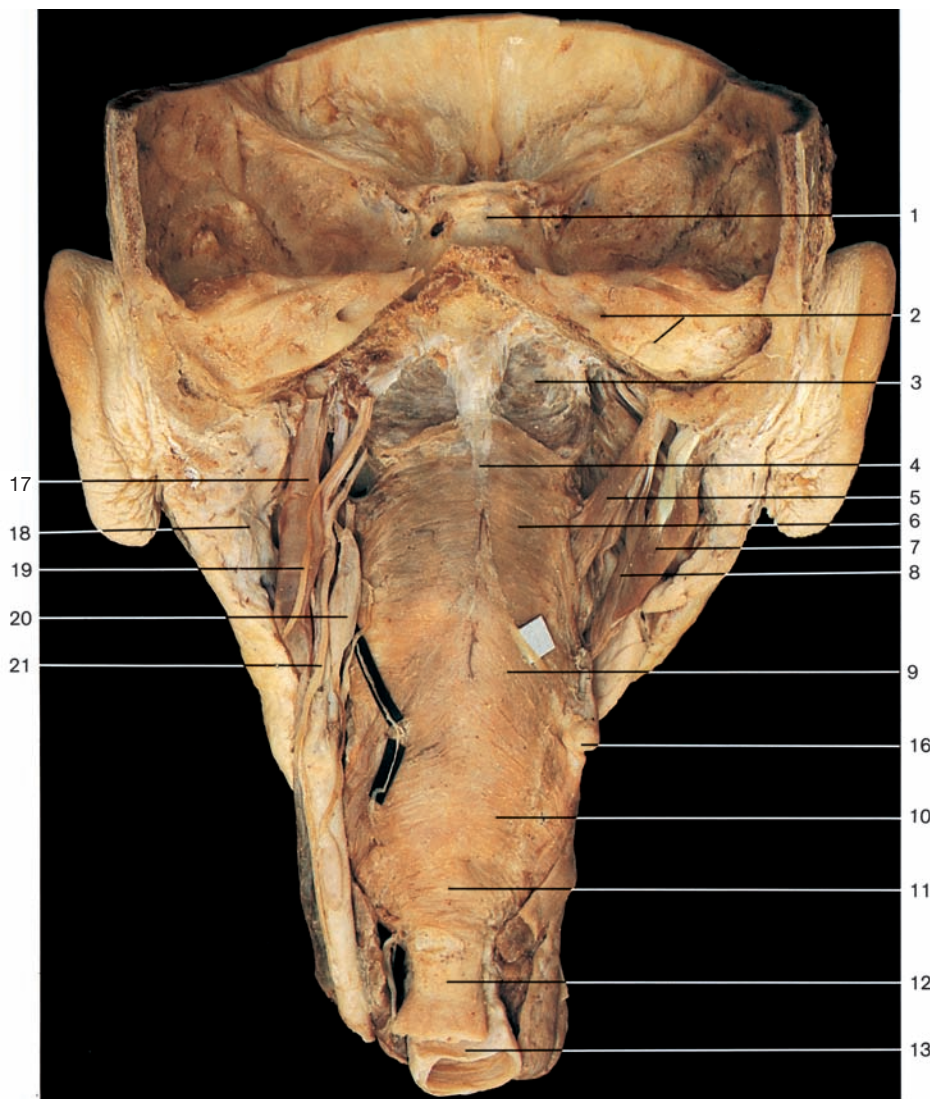


Dissection of pharynx, supra-, and infrahyoid muscles (lateral aspect). Mandible partly removed.

- 1 Maxilla
- 2 Pterygomandibular raphe
- 3 Buccinator muscle
- 4 Mandible (divided)
- 5 Depressor anguli oris muscle
- 6 Mylohyoid muscle
- 7 Anterior belly of digastric muscle
- 8 Hyoid bone
- 9 Thyroid cartilage
- 10 Cricothyroid muscle
- 11 Styloid process
- 12 Medial pterygoid muscle (divided)
- 13 Posterior belly of digastric muscle
- 14 Styloglossus muscle
- 15 Stylohyoid muscle
- 16 Thyropharyngeal part of inferior constrictor muscle of pharynx
- 17 Thyrohyoid muscle
- 18 Cricopharyngeal part of inferior constrictor muscle of pharynx
- 19 Esophagus
- 20 Trachea
- 21 First molar of maxilla
- 22 Tongue
- 23 Inferior longitudinal muscle of tongue
- 24 Genioglossus muscle
- 25 Superior constrictor muscle of pharynx
- 26 Hypoglossal nerve
- 27 Hyoglossus muscle
- 28 Superior laryngeal nerve and superior laryngeal artery

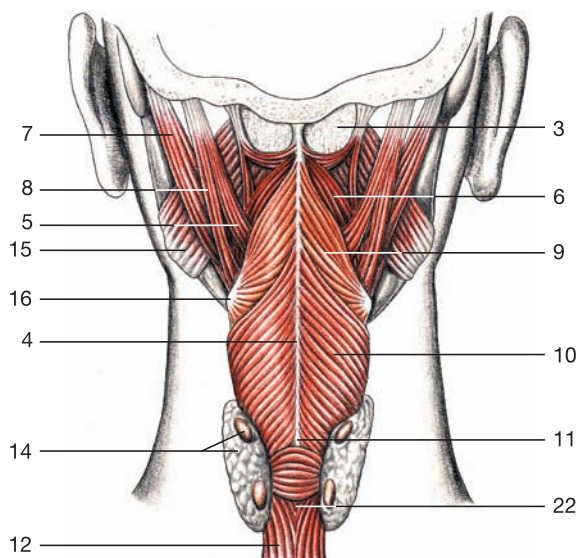


Dissection of pharynx, supra-, and infrahyoid muscles (lateral aspect). Oral cavity opened.

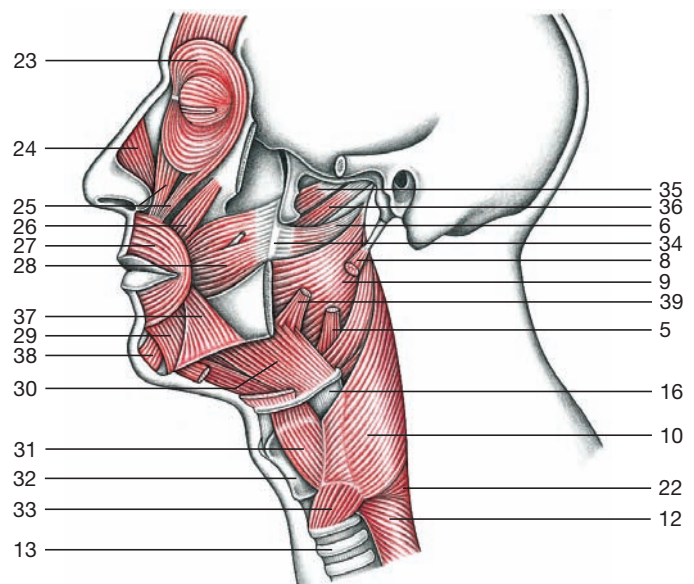


Muscles of the pharynx (posterior aspect).

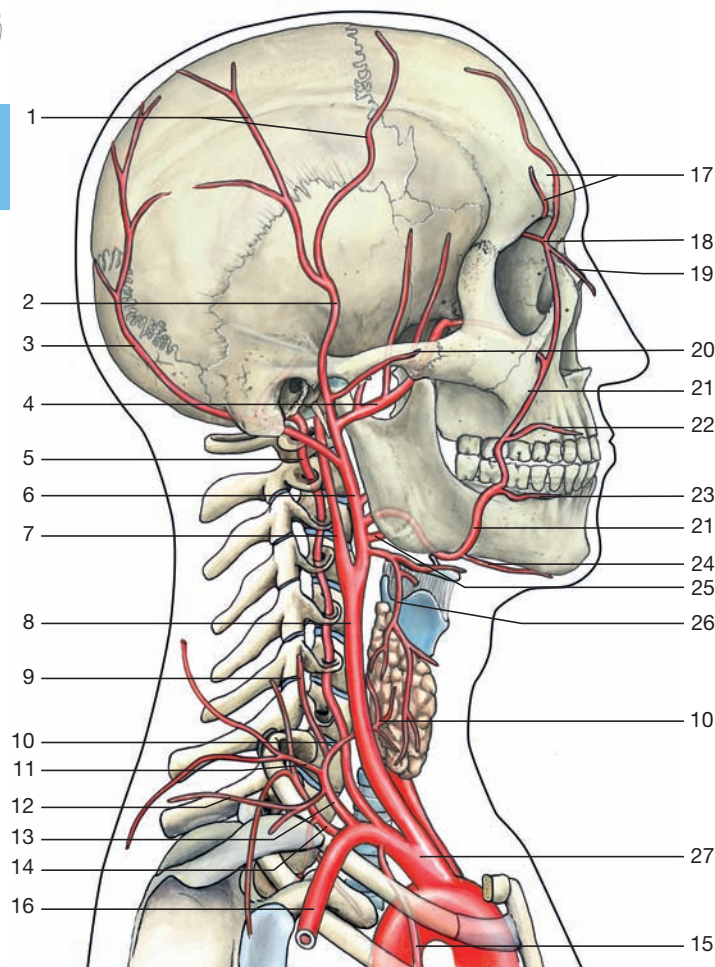
- 1 Sella turcica
- 2 Internal acoustic meatus and petrous part of temporal bone
- 3 Pharyngobasilar fascia
- 4 Fibrous raphe of pharynx
- 5 Stylopharyngeal muscle
- 6 Superior constrictor muscle of pharynx
- 7 Posterior belly of digastric muscle
- 8 Stylohyoid muscle
- 9 Middle constrictor muscle of pharynx
- 10 Inferior constrictor muscle of pharynx
- 11 Muscle-free area (Killian's triangle)
- 12 Esophagus
- 13 Trachea
- 14 Thyroid and parathyroid glands
- 15 Medial pterygoid muscle
- 16 Greater horn of hyoid bone
- 17 Internal jugular vein
- 18 Parotid gland
- 19 Accessory nerve
- 20 Superior cervical ganglion of sympathetic trunk
- 21 Vagus nerve
- 22 Laimer's triangle (area prone to developing diverticula)
- 23 Orbicularis oculi muscle
- 24 Nasalis muscle
- 25 Levator labii superioris and levator labii alaeque nasi muscles
- 26 Levator anguli oris muscle
- 27 Orbicularis oris muscle
- 28 Buccinator muscle
- 29 Depressor labii inferioris muscle
- 30 Hyoglossus muscle
- 31 Thyrohyoid muscle
- 32 Thyroid cartilage
- 33 Cricothyroid muscle
- 34 Pterygomandibular raphe
- 35 Tensor veli palatini muscle
- 36 Levator veli palatini muscle
- 37 Depressor anguli oris muscle
- 38 Mentalis muscle
- 39 Styloglossus muscle



Muscles of the pharynx (posterior aspect).



Muscles of the pharynx (lateral aspect).

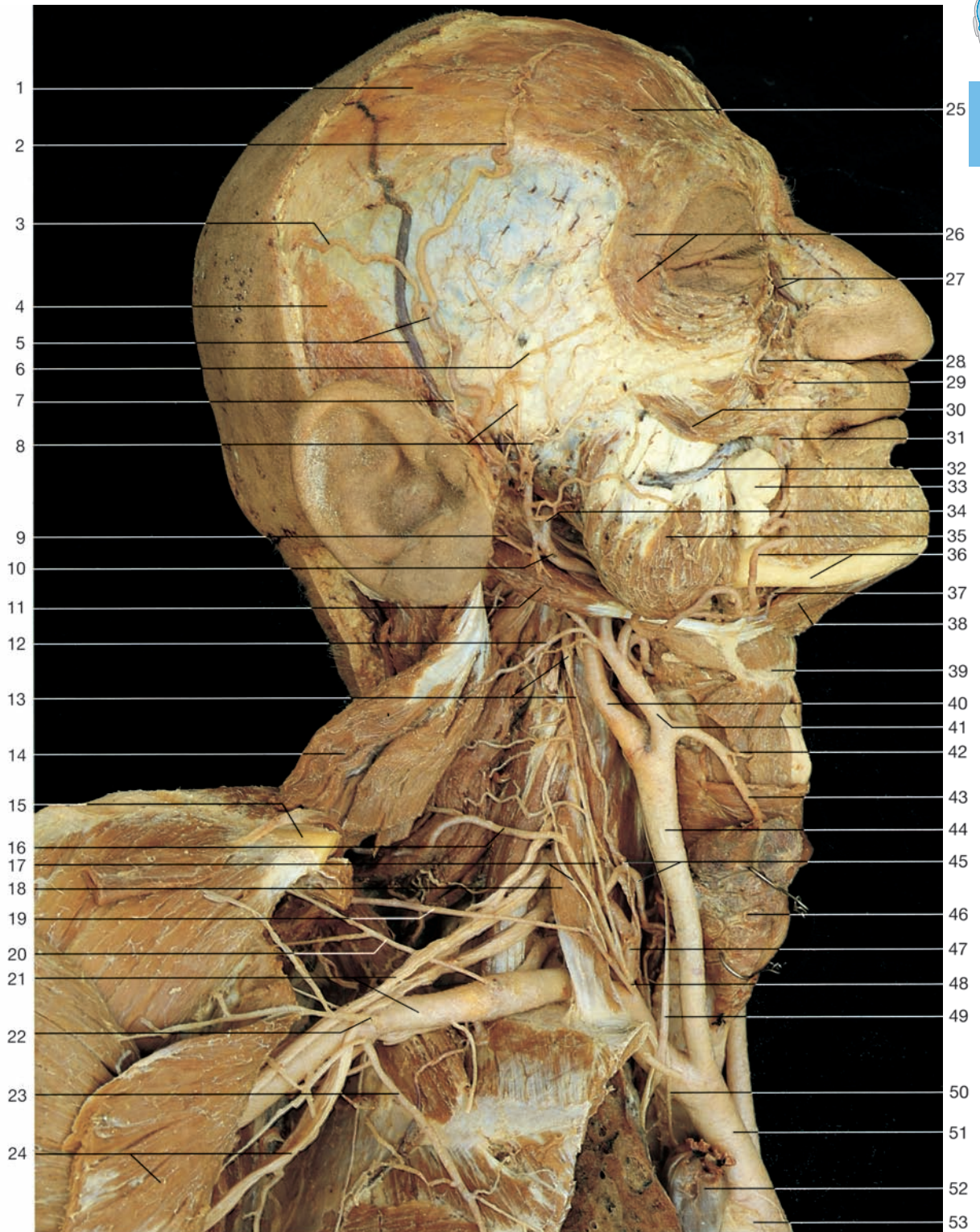


- 1 Frontal and parietal branches of superficial temporal artery
- 2 Superficial temporal artery
- 3 Occipital artery
- 4 Maxillary artery
- 5 Vertebral artery
- 6 External carotid artery
- 7 Internal carotid artery
- 8 Common carotid artery (divided)
- 9 Ascending cervical artery
- 10 Inferior thyroid artery
- 11 Transverse cervical artery with two branches (superficial cervical artery and descending scapular artery)
- 12 Suprascapular artery
- 13 Thyrocervical trunk
- 14 Costocervical trunk with two branches (deep cervical artery and supreme intercostal artery)
- 15 Internal thoracic artery
- 16 Axillary artery
- 17 Supra-orbital and supratrochlear arteries
- 18 Angular artery
- 19 Dorsal nasal artery
- 20 Transverse facial artery
- 21 Facial artery
- 22 Superior labial artery
- 23 Inferior labial artery
- 24 Submental artery
- 25 Lingual artery
- 26 Superior thyroid artery
- 27 Brachiocephalic trunk

Arteries of head and neck (lateral aspect). Diagram of the main branches of external carotid and subclavian arteries.

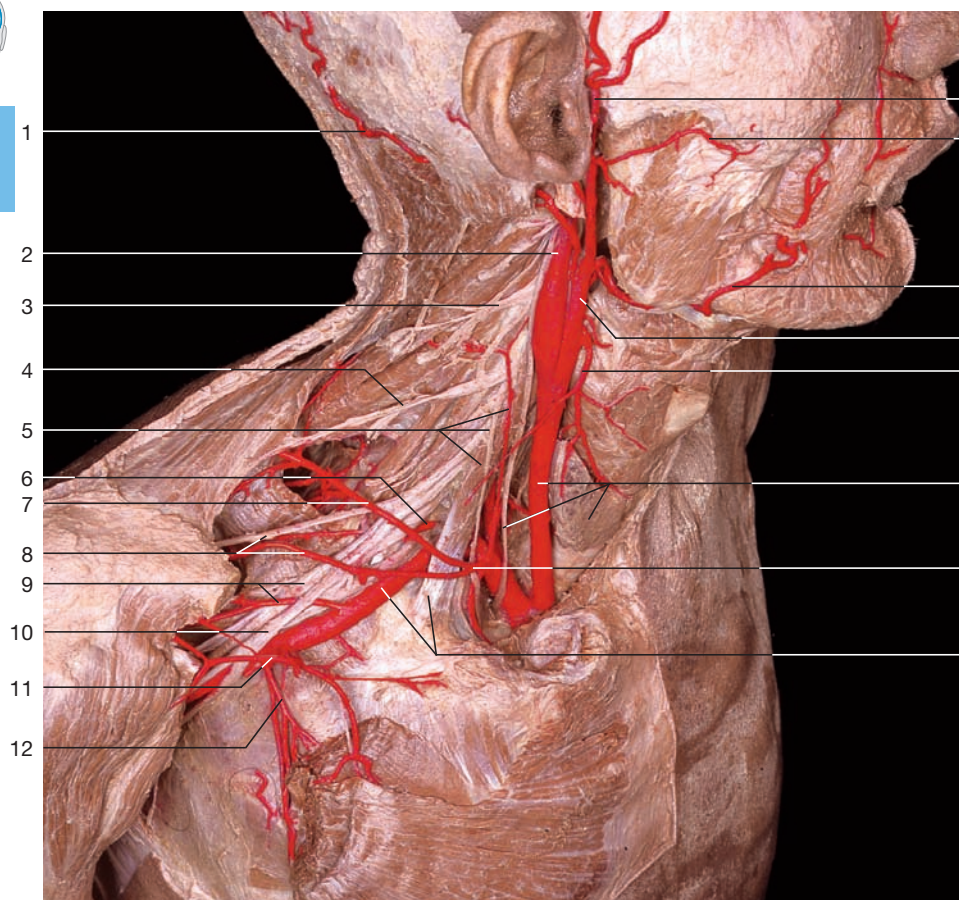
▷ **To page 171:**

- 1 Galea aponeurotica
- 2 Frontal branch } of superficial
- 3 Parietal branch } temporal artery
- 4 Superior auricular muscle
- 5 Superficial temporal artery and vein
- 6 Middle temporal artery
- 7 Auriculotemporal nerve
- 8 Branches of facial nerve
- 9 Facial nerve
- 10 External carotid artery within the retromandibular fossa
- 11 Posterior belly of digastric muscle
- 12 Sternocleidomastoid artery
- 13 Sympathetic trunk and superior cervical ganglion
- 14 Sternocleidomastoid muscle (divided and reflected)
- 15 Clavicle (divided)
- 16 Transverse cervical artery
- 17 Ascending cervical artery and phrenic nerve
- 18 Anterior scalene muscle
- 19 Suprascapular artery
- 20 Dorsal scapular artery
- 21 Brachial plexus and axillary artery
- 22 Thoraco-acromial artery
- 23 Lateral thoracic artery
- 24 Median nerve (displaced) and pectoralis minor muscle (reflected)
- 25 Frontal belly of occipitofrontalis muscle
- 26 Orbital part of orbicularis oculi muscle
- 27 Angular artery and vein
- 28 Facial artery
- 29 Superior labial artery
- 30 Zygomaticus major muscle
- 31 Inferior labial artery
- 32 Parotid duct
- 33 Buccal fat pad
- 34 Maxillary artery
- 35 Masseter muscle
- 36 Facial artery and mandible
- 37 Submental artery
- 38 Anterior belly of digastric muscle



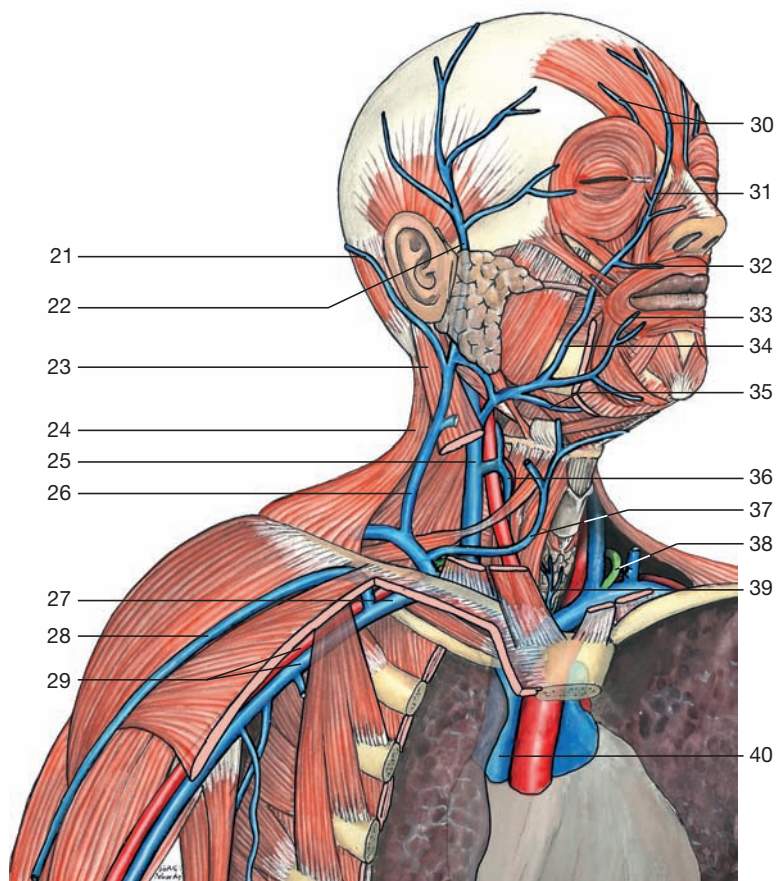
Main branches of head and neck arteries (lateral aspect). Anterior thoracic wall and clavicle partly removed; pectoralis muscles have been reflected to display the subclavian and axillary arteries.

- | | |
|--|--|
| 39 Hyoid bone | 46 Thyroid gland (right lobe) |
| 40 Internal carotid artery | 47 Vertebral artery |
| 41 External carotid artery | 48 Thyrocervical trunk |
| 42 Superior laryngeal artery | 49 Vagus nerve |
| 43 Superior thyroid artery | 50 Ansa subclavia of sympathetic trunk |
| 44 Common carotid artery | 51 Brachiocephalic trunk |
| 45 Thyroid ansa of sympathetic trunk and inferior thyroid artery | 52 Superior vena cava (divided) |
| | 53 Aortic arch |



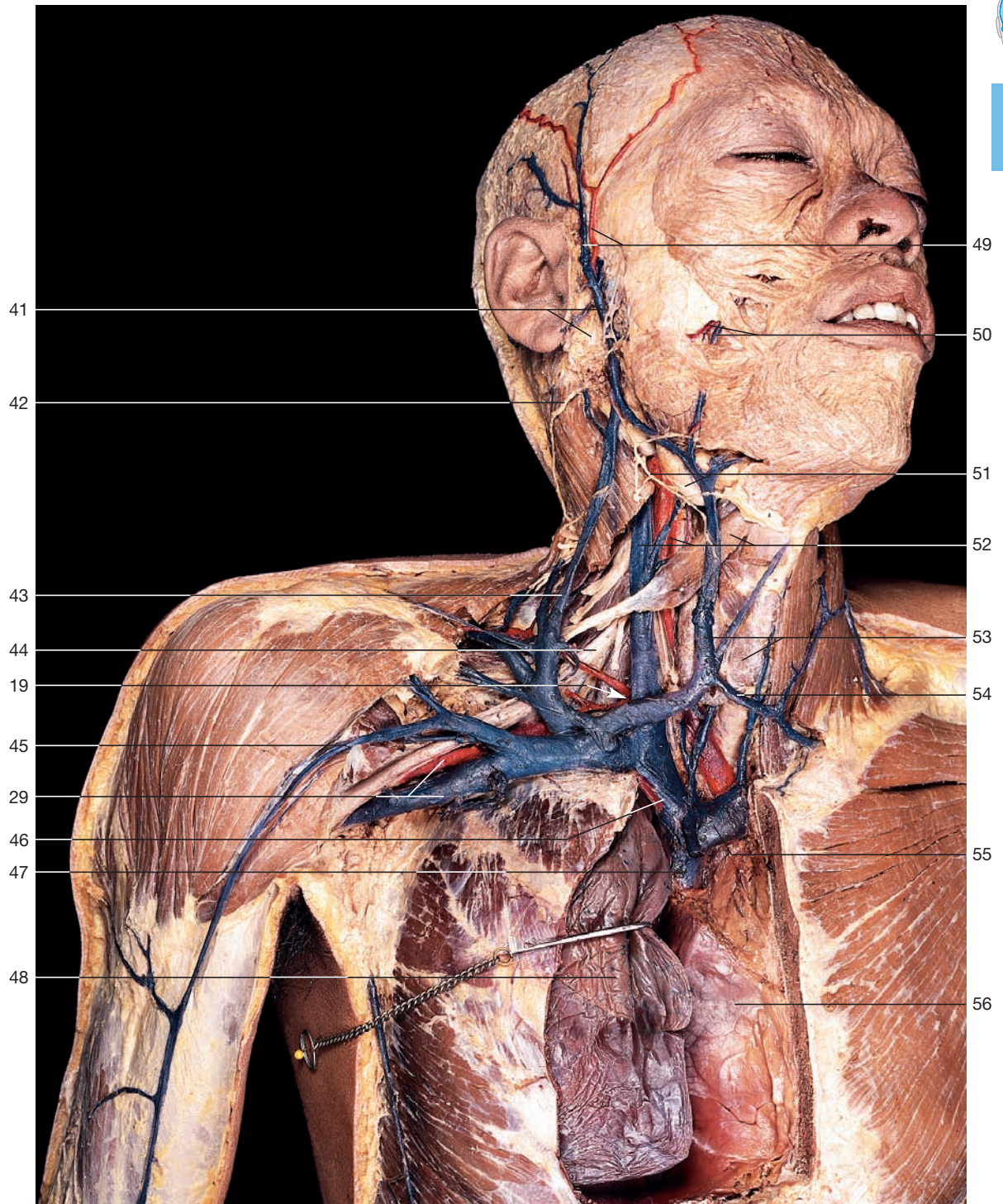
- 1 Occipital branch of occipital artery
- 2 Internal carotid artery
- 3 Cervical plexus
- 4 Supraclavicular nerve
- 5 Phrenic nerve and ascending cervical artery on anterior scalene muscle
- 6 Transverse cervical artery
- 7 Superficial cervical artery
- 8 Suprascapular artery and nerve
- 9 Brachial plexus and transverse cervical artery
- 10 Lateral cord of brachial plexus
- 11 Thoraco-acromial artery
- 12 Lateral thoracic artery
- 13 Superficial temporal artery
- 14 Transverse facial artery
- 15 Facial artery
- 16 External carotid artery
- 17 Superior thyroid artery
- 18 Common carotid artery, vagus nerve, and thyroid gland
- 19 Thyrocervical trunk
- 20 Subclavian artery and anterior scalene muscle

Arteries of head and neck (antero-lateral aspect). Clavicle, sternocleidomastoid muscle, and veins have been partly removed. Arteries have been colored red.



- 21 Occipital vein
- 22 Superficial temporal vein
- 23 Sternocleidomastoid muscle
- 24 Trapezius muscle
- 25 Internal jugular vein
- 26 External jugular vein
- 27 Subclavian vein
- 28 Cephalic vein
- 29 Axillary vein and artery
- 30 Supra-orbital veins
- 31 Angular vein
- 32 Superior labial vein
- 33 Inferior labial vein
- 34 Facial vein
- 35 Submental vein
- 36 Superior thyroid vein
- 37 Anterior jugular vein
- 38 Thoracic duct
- 39 Inferior thyroid vein
- 40 Superior vena cava
- 41 Parotid gland and facial nerve
- 42 Great auricular nerve
- 43 External jugular vein
- 44 Brachial plexus
- 45 Cephalic vein within the deltopectoral triangle
- 46 Right brachiocephalic vein
- 47 Superior vena cava
- 48 Right lung (reflected)
- 49 Superficial temporal artery and vein
- 50 Facial artery and vein
- 51 Cervical branch of facial nerve and submandibular gland
- 52 Internal jugular vein, common carotid artery, and omohyoid muscle
- 53 Anterior jugular vein and thyroid gland
- 54 Jugular venous arch
- 55 Left brachiocephalic vein
- 56 Pericardium of heart (location of right atrium)

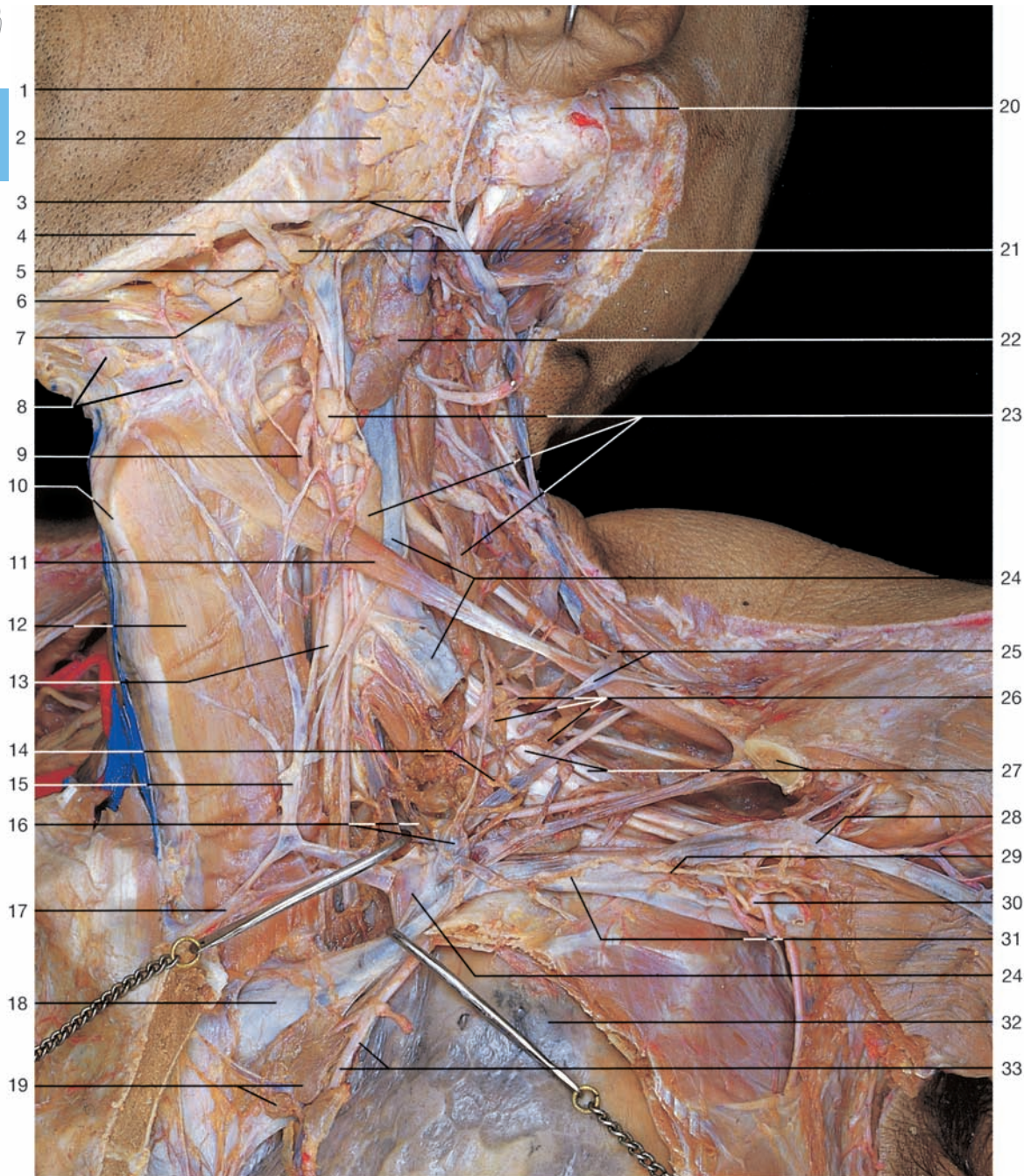
Veins of head, neck, and shoulder (anterior aspect). Sternocleidomastoid muscle and anterior thoracic wall partly removed. Note the venous connection with the superior vena cava.



Veins of head, neck, and shoulder (anterior aspect). Part of the thoracic wall, clavicle, and sternocleidomastoid muscle have been removed. Veins have been colored blue; arteries have been colored red.

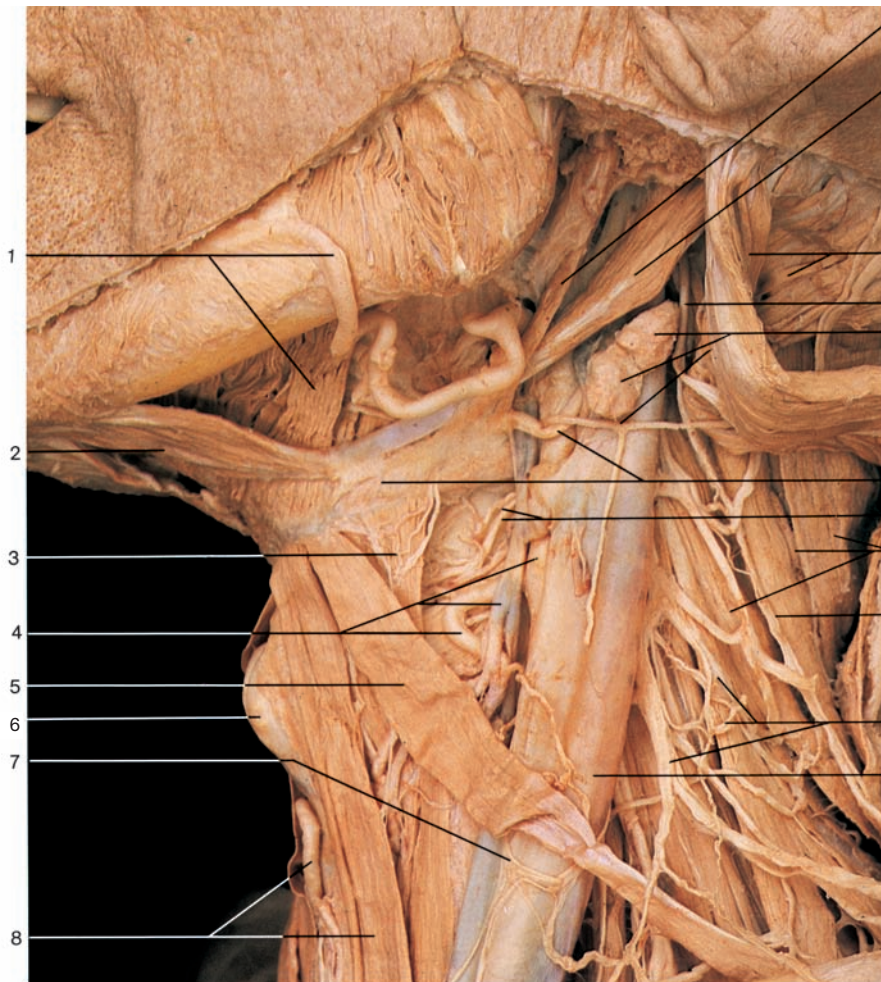
The **internal jugular vein** is the continuation of the sigmoid sinus, which drains most of the venous blood from the brain together with the external cerebrospinal fluid. By joining the subclavian vein, it forms the right brachiocephalic vein, which continues on the right side directly into the superior vena cava. The common way to introduce the lead from a pacemaker device into the heart is by way of the cephalic vein. On the left side, the thoracic duct joins the internal jugular vein at the point where the subclavian vein

and the internal jugular vein form the left brachiocephalic vein. Note that the subclavian vein lies in front of the anterior scalene muscle, whereas the subclavian artery and the brachial plexus lie posterior to that muscle. The **cephalic vein** joins the axillary vein by passing into the deltopectoral triangle. The **subclavian vein** is strongly fixed to the first rib, so it can be punctured with a needle at that point (underneath the sternal end of the clavicle) to introduce a catheter (subclavian line).



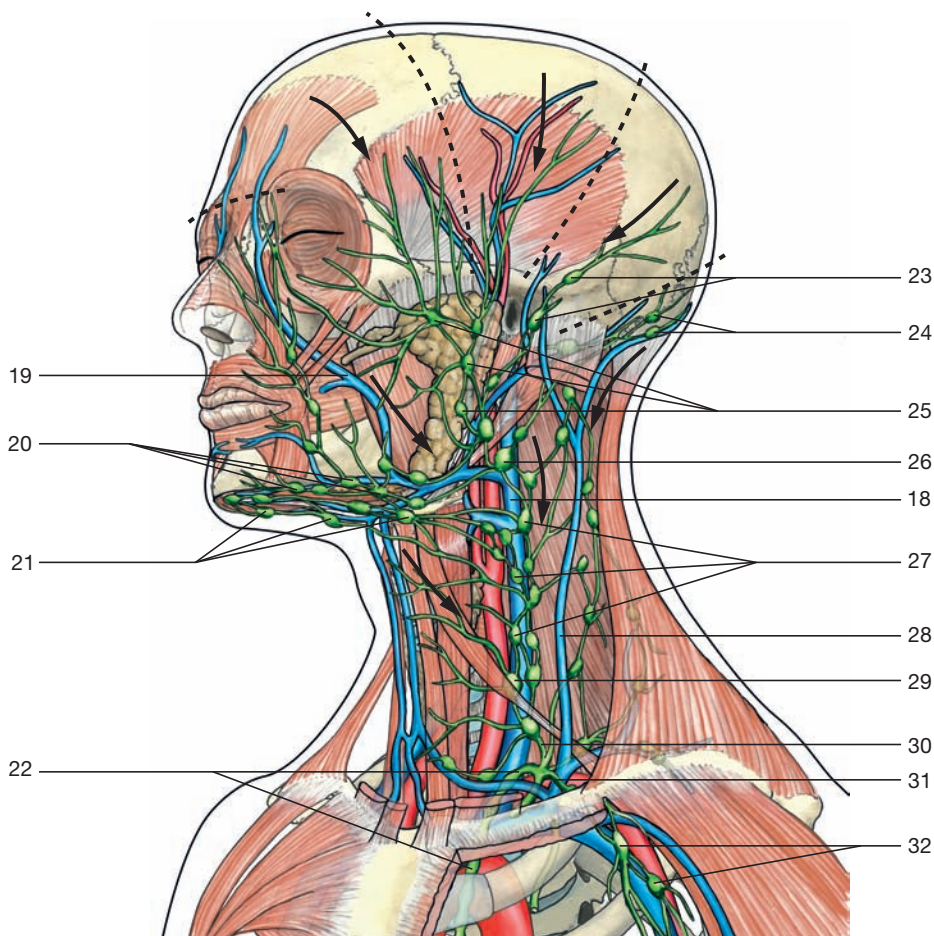
Lymph nodes and lymph vessels of the neck, left side (oblique-lateral aspect). The sternocleidomastoid muscle and the left half of the thoracic wall have been removed. Lower part of the internal jugular vein has been cut and laterally displaced to show the thoracic duct.

- | | | |
|--------------------------------------|--|--------------------------------------|
| 1 Superficial parotid lymph node | 13 Common carotid artery | 24 Internal jugular vein |
| 2 Parotid gland | 14 Supraclavicular lymph nodes | 25 External jugular vein |
| 3 Great auricular nerve | 15 Anterior jugular vein | 26 Jugulo-omohyoid lymph nodes |
| 4 Mandible | 16 Thoracic duct and internal jugular vein | 27 Brachial plexus |
| 5 Facial vein | 17 Jugular venous arch | 28 Cephalic vein |
| 6 Anterior belly of digastric muscle | 18 Left brachiocephalic vein | 29 Subclavian trunk |
| 7 Submandibular gland | 19 Superior mediastinal lymph nodes | 30 Infraclavicular lymph nodes |
| 8 Submental lymph nodes | 20 Retro-auricular lymph nodes | 31 Subclavian vein |
| 9 Superior thyroid artery | 21 Submandibular nodes | 32 Lung |
| 10 Thyroid cartilage | 22 Superficial cervical lymph nodes | 33 Internal thoracic artery and vein |
| 11 Omohyoid muscle | 23 Jugulodigastric lymph nodes and jugular trunk | |
| 12 Sternohyoid muscle | | |



Carotid triangle, left side (lateral aspect). Sternocleidomastoid muscle reflected.

- 1 Mylohyoid muscle and facial artery
- 2 Anterior belly of digastric muscle
- 3 Thyrohyoid muscle
- 4 External carotid artery, superior thyroid artery, and vein
- 5 Omohyoid muscle
- 6 Thyroid cartilage
- 7 Ansa cervicalis
- 8 Sternohyoid muscle and superior thyroid artery
- 9 Stylohyoid muscle
- 10 Posterior belly of digastric muscle
- 11 Sternocleidomastoid muscle (reflected)
- 12 Superior cervical lymph nodes and sternocleidomastoid artery
- 13 Hyoid bone and hypoglossal nerve (n. XII)
- 14 Splenius capitis and levator scapulae muscles
- 15 Superior laryngeal artery and internal branch of superior laryngeal nerve
- 16 Accessory nerve
- 17 Cervical plexus
- 18 Internal jugular vein
- 19 Facial vein
- 20 Submandibular lymph nodes
- 21 Submental lymph nodes
- 22 Thoracic duct
- 23 Retro-auricular lymph nodes
- 24 Occipital lymph nodes
- 25 Parotid lymph nodes
- 26 Jugulodigastric lymph node
- 27 Deep cervical lymph nodes
- 28 External jugular vein
- 29 Jugulo-omohyoid lymph node
- 30 Jugular trunk
- 31 Subclavian trunk
- 32 Infraclavicular lymph nodes

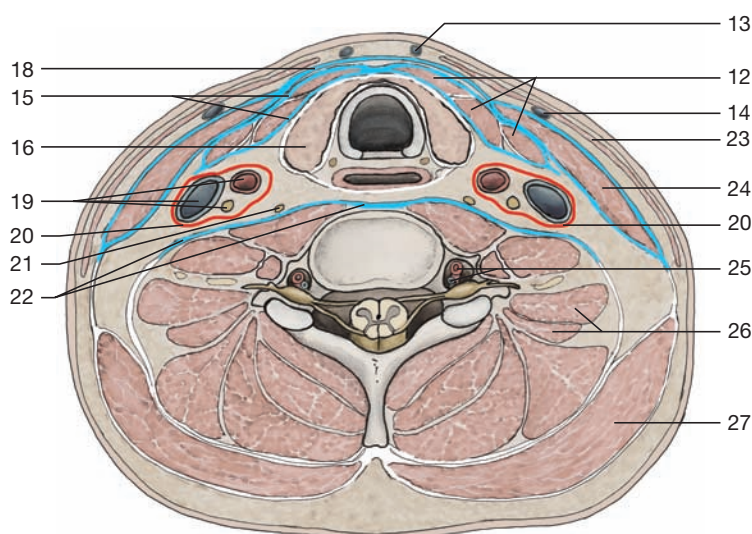


Lymph nodes and veins of head and neck (oblique-lateral aspect). Dotted lines = border between irrigation areas; arrows: direction of lymph flow.



Anterior region of the neck (superficial layer). The superficial fascia has been removed.

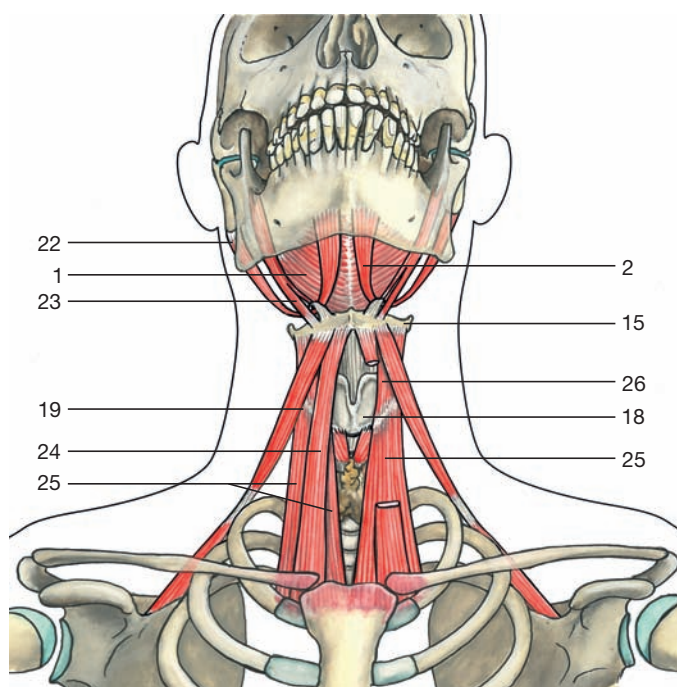
- | | | |
|-----------------------------------|--|--|
| 1 Submandibular gland | 8 Mandible | 13 Anterior jugular veins |
| 2 Cervical branch of facial nerve | 9 Facial artery and vein | 14 External jugular vein |
| 3 Transverse cervical nerve | 10 Anterior belly of digastric muscle | 15 Pretracheal lamina of cervical fascia |
| 4 Lateral supraclavicular nerves | 11 Mylohyoid muscle | 16 Thyroid gland |
| 5 Middle supraclavicular nerves | 12 Infrahyoid muscles | 17 Clavicle |
| 6 Medial supraclavicular nerves | (sternohyoid, sternothyroid, and omohyoid muscles) | 18 Superficial lamina of cervical fascia |
| 7 Great auricular nerve | | 19 Carotid sheath with common carotid artery, internal jugular vein, and vagus nerve |



◁ **Cross section through the neck** at the level of the thyroid gland. Notice the position of the three laminae of cervical fascia (blue colored).

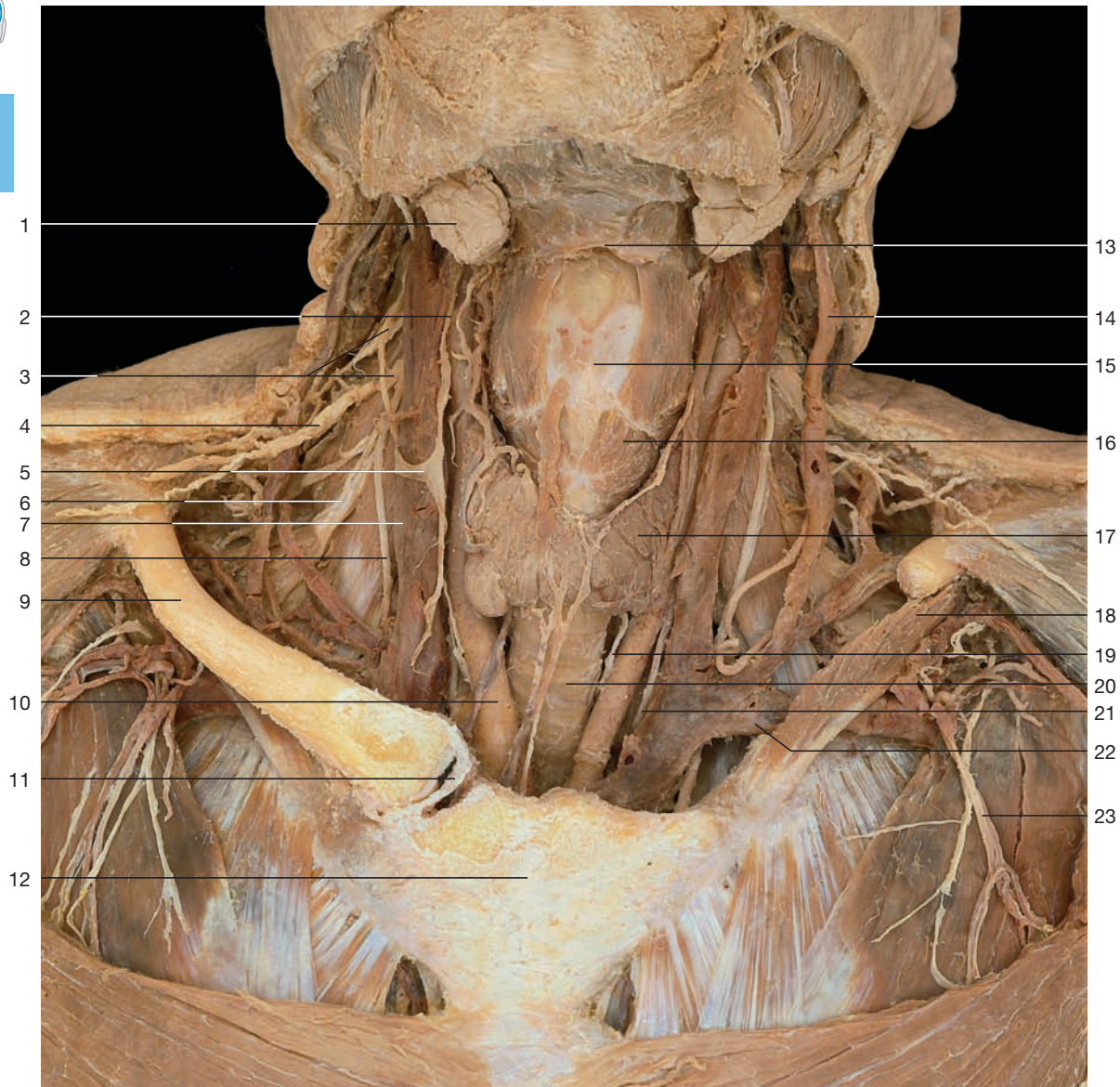


Anterior region of the neck with anterior triangle (right side: superficial layer, left side: deeper layer). The pretracheal lamina of cervical fascia and left sternocleidomastoid muscle have been removed.

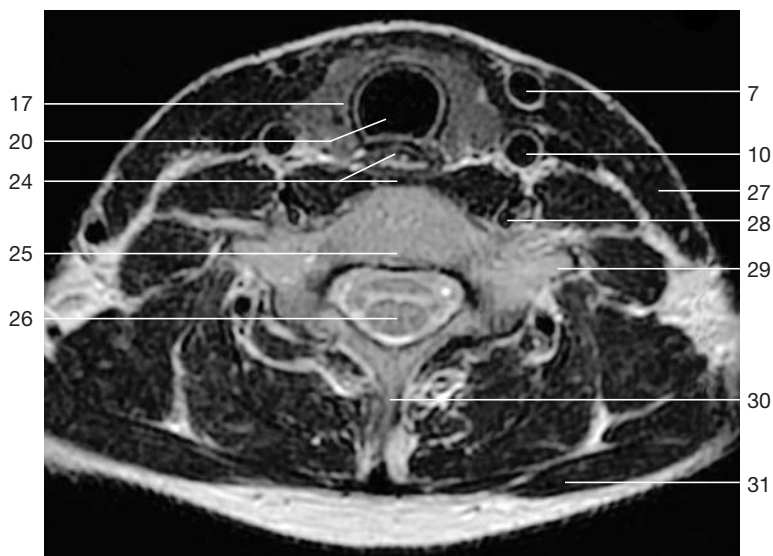


Supra- and infrahyoid muscles (anterior aspect).

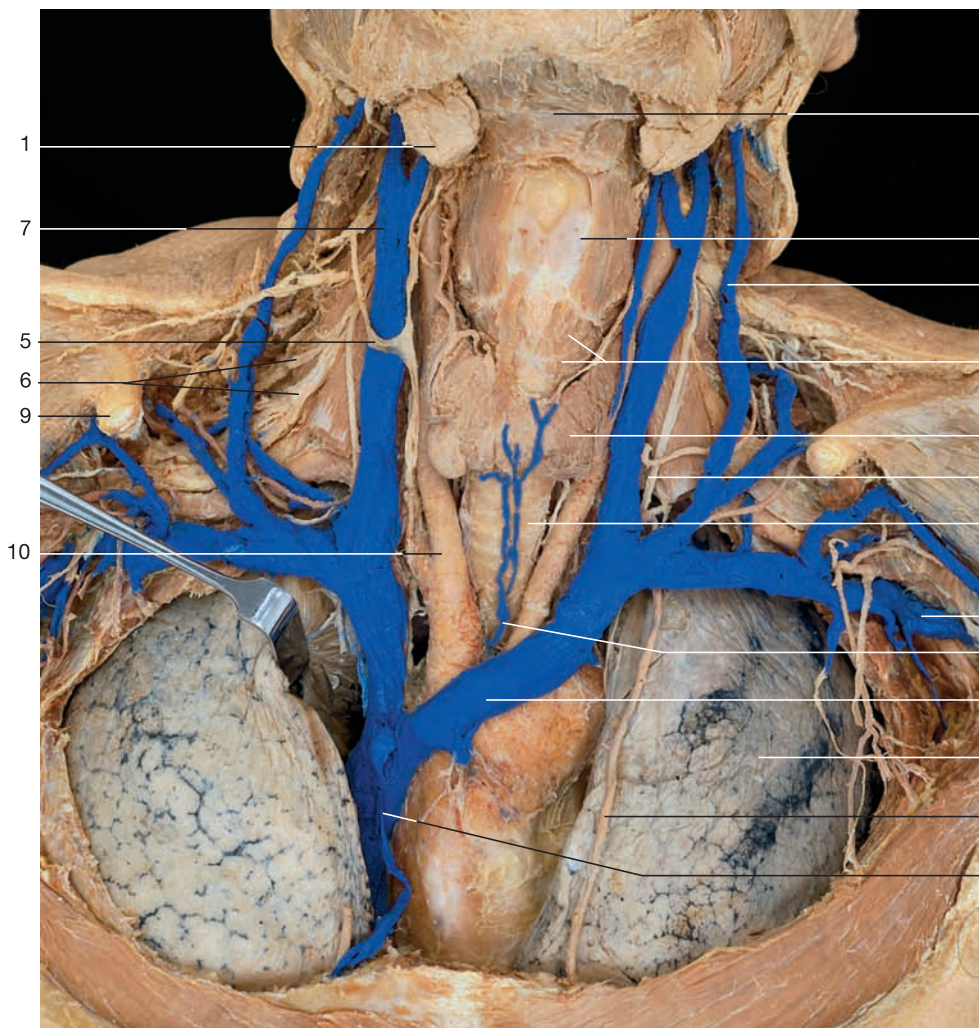
- 1 Mylohyoid muscle
- 2 Anterior belly of digastric muscle
- 3 Facial artery
- 4 Submandibular gland
- 5 Great auricular nerve
- 6 Internal jugular vein and common carotid artery
- 7 Transverse cervical nerve and omohyoid muscle
- 8 Sternohyoid muscle and superior thyroid artery
- 9 Sternocleidomastoid muscle (sternal head)
- 10 Left sternocleidomastoid muscle (reflected)
- 11 Sternocleidomastoid muscle (clavicular head) and lateral supraclavicular nerves
- 12 Middle supraclavicular nerves
- 13 Medial supraclavicular nerves
- 14 Mandible
- 15 Hyoid bone
- 16 Superficial cervical lymph nodes
- 17 Left superior thyroid artery and external carotid artery
- 18 Thyroid cartilage
- 19 Superior belly of omohyoid muscle
- 20 Internal jugular vein and branches of ansa cervicalis
- 21 Thyroid gland and unpaired inferior thyroid vein
- 22 Posterior belly of digastric muscle
- 23 Stylohyoid muscle
- 24 Sternohyoid muscle
- 25 Sternothyroid muscle
- 26 Thyrohyoid muscle



Anterior region of the neck (deep layer). Sternocleidomastoid muscles and left clavicle have been removed. Thyroid gland in relation to trachea, larynx, and vessels of the neck is shown.

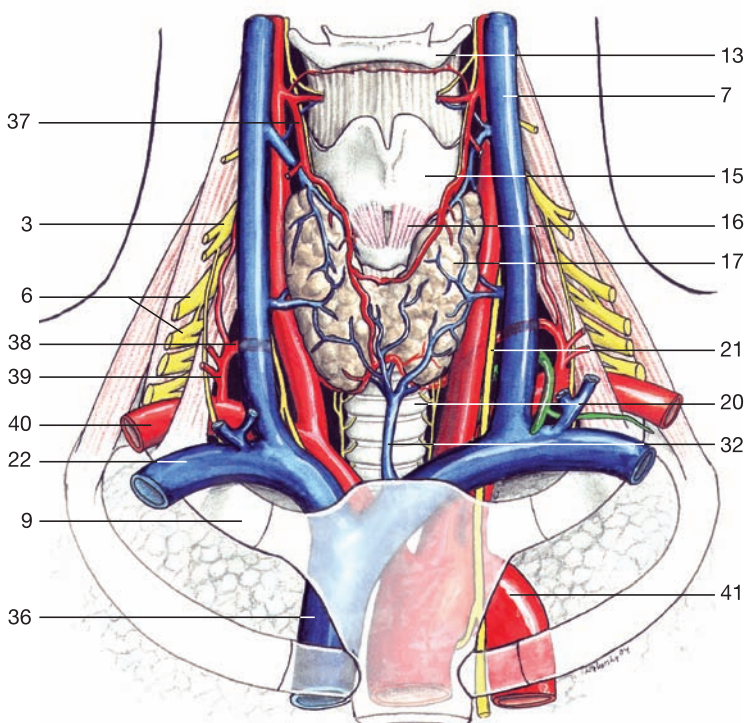


Cross section through the neck at the level of the thyroid gland (MRI scan). (Courtesy of Prof. Heuck, Munich, Germany.)

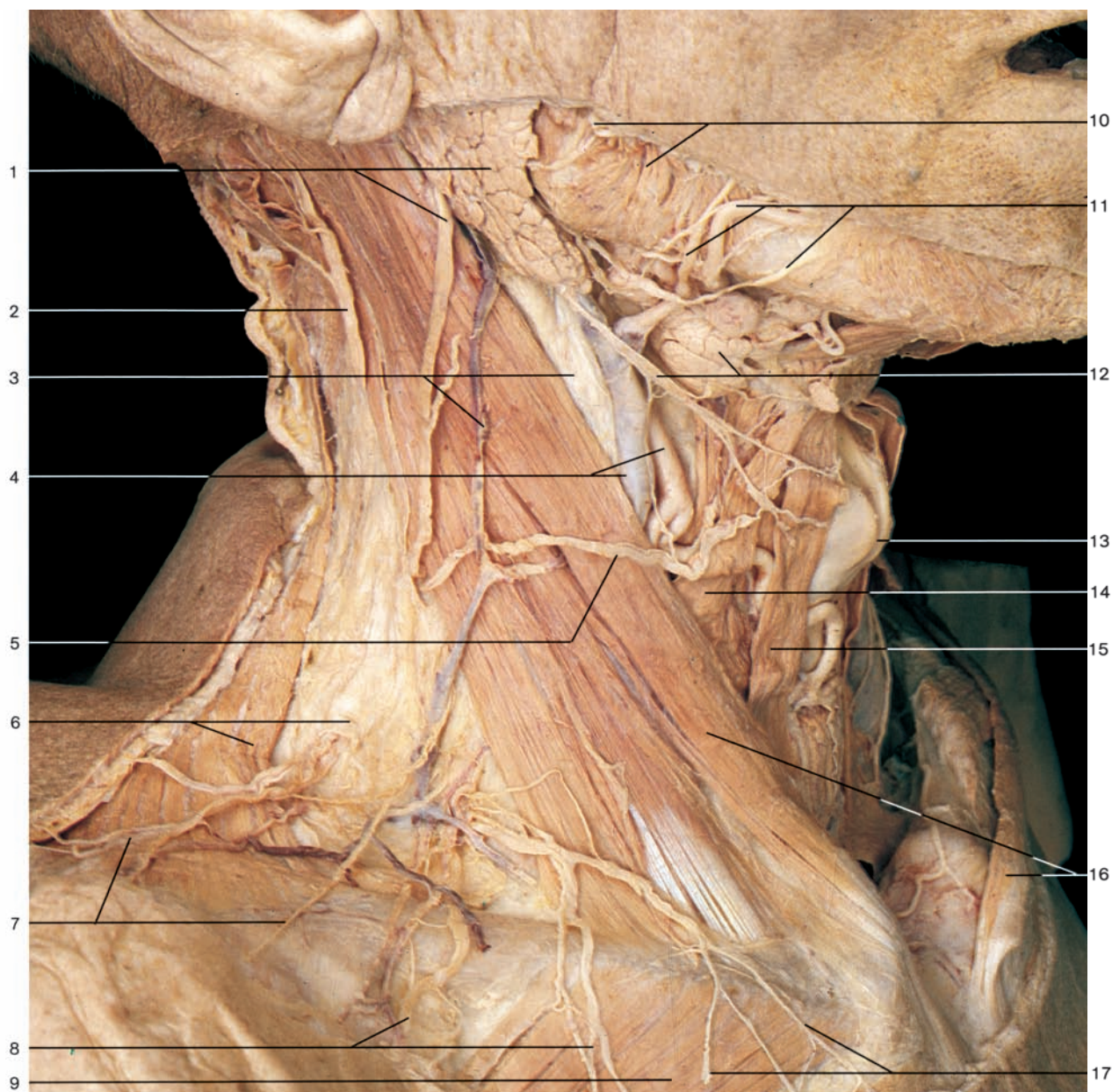


Anterior region of the neck and thoracic cavity (deeper layer). Both clavicles, sternum, and ribs have been removed. Main veins have been colored blue.

- 1 Submandibular gland
- 2 Cervical branch of facial nerve (n. VII)
- 3 Cervical plexus
- 4 Middle supraclavicular nerves
- 5 Ansa cervicalis
- 6 Brachial plexus
- 7 Internal jugular vein
- 8 Phrenic nerve
- 9 Clavicle
- 10 Common carotid artery
- 11 Sternoclavicular joint with articular disc
- 12 Manubrium of sternum
- 13 Hyoid bone
- 14 External jugular vein
- 15 Thyroid cartilage
- 16 Cricothyroid muscle
- 17 Thyroid gland
- 18 Subclavius muscle
- 19 Recurrent laryngeal nerve
- 20 Trachea
- 21 Vagus nerve (n. X)
- 22 Subclavian vein
- 23 Middle pectoral nerve
- 24 Esophagus
- 25 Body of cervical vertebra
- 26 Spinal cord
- 27 Sternocleidomastoid muscle
- 28 Vertebral artery
- 29 Transverse process of cervical vertebra
- 30 Spinous process of cervical vertebra
- 31 Trapezius muscle
- 32 Inferior thyroid vein
- 33 Left brachiocephalic vein
- 34 Superior lobe of left lung
- 35 Internal thoracic artery
- 36 Superior vena cava
- 37 Superior thyroid artery
- 38 Inferior thyroid artery
- 39 Thyrocervical trunk
- 40 Subclavian artery
- 41 Aortic arch

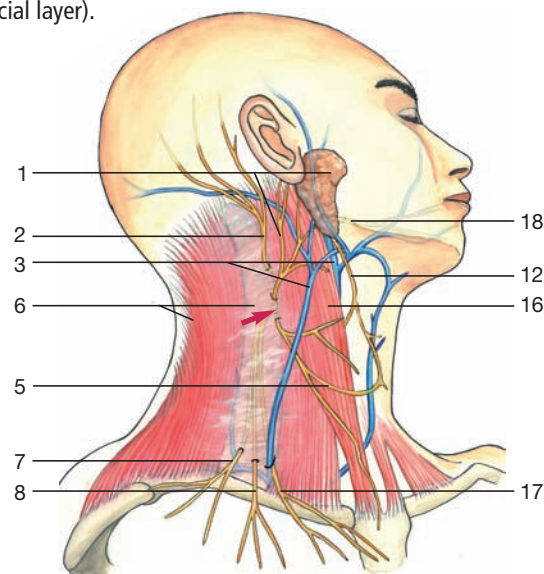


Anterior region of the neck. Regional anatomy of the thyroid gland with related blood vessels.



Lateral region of the neck with posterior and carotid triangles (superficial layer).

- | | |
|--|---|
| 1 Parotid gland and great auricular nerve | 10 Buccal branch of facial nerve and masseter muscle |
| 2 Lesser occipital nerve | 11 Facial artery and vein and mandibular branch of facial nerve |
| 3 Internal and external jugular veins | 12 Cervical branch of facial nerve and submandibular gland (only in the dissection) |
| 4 Retromandibular vein and external carotid artery | 13 Thyroid cartilage |
| 5 Transverse cervical nerve with communicating branch to cervical branch of facial nerve | 14 Omohyoid muscle |
| 6 Trapezius muscle and superficial lamina of cervical fascia | 15 Sternohyoid muscle |
| 7 Lateral supraclavicular nerves | 16 Sternocleidomastoid muscle |
| 8 Middle supraclavicular nerves | 17 Medial supraclavicular nerves |
| 9 Pectoralis major muscle | 18 Mandibular branch of facial nerve |

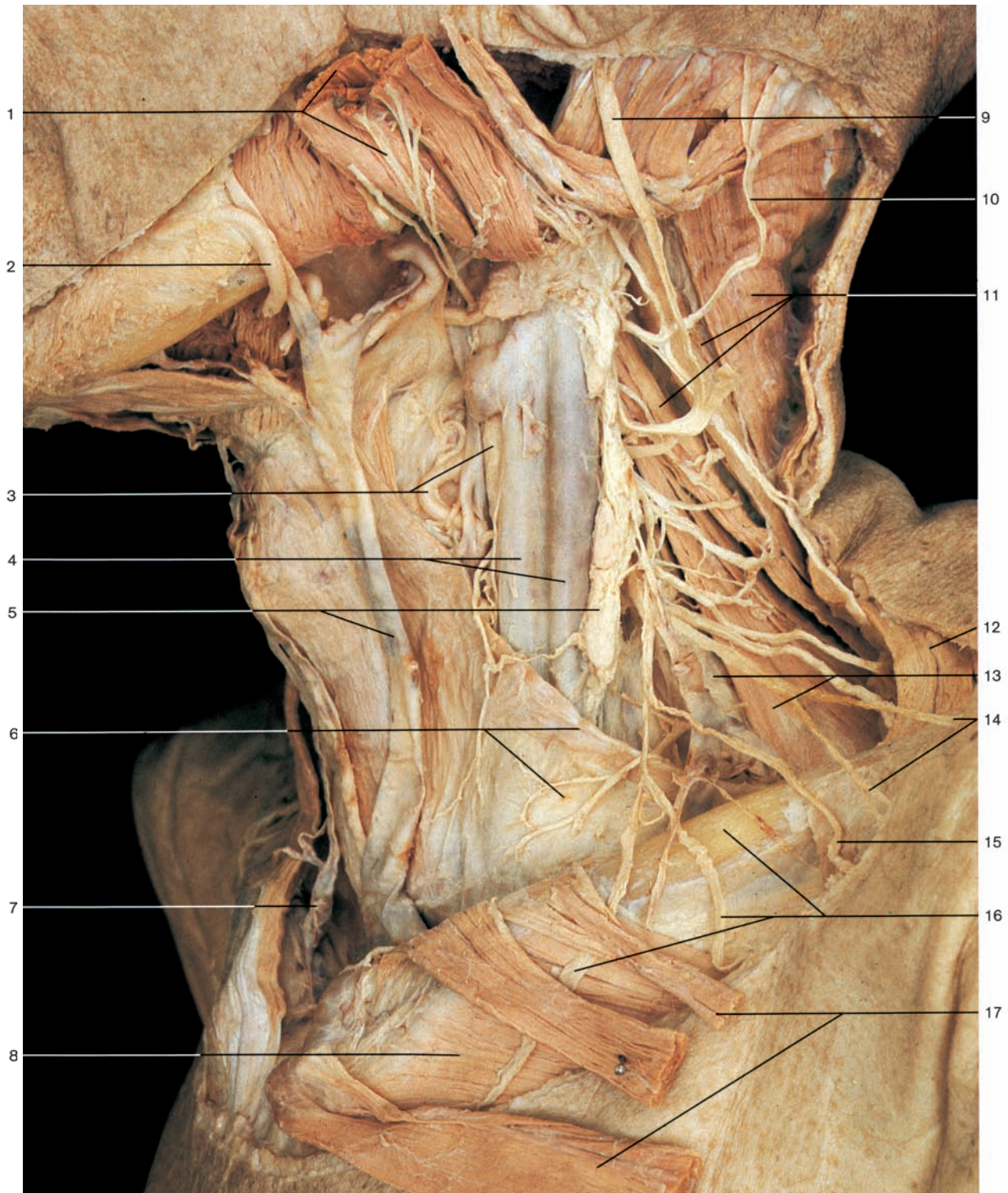


Cutaneous branches of cervical plexus (lateral region). Erb's point is indicated by an arrowhead.



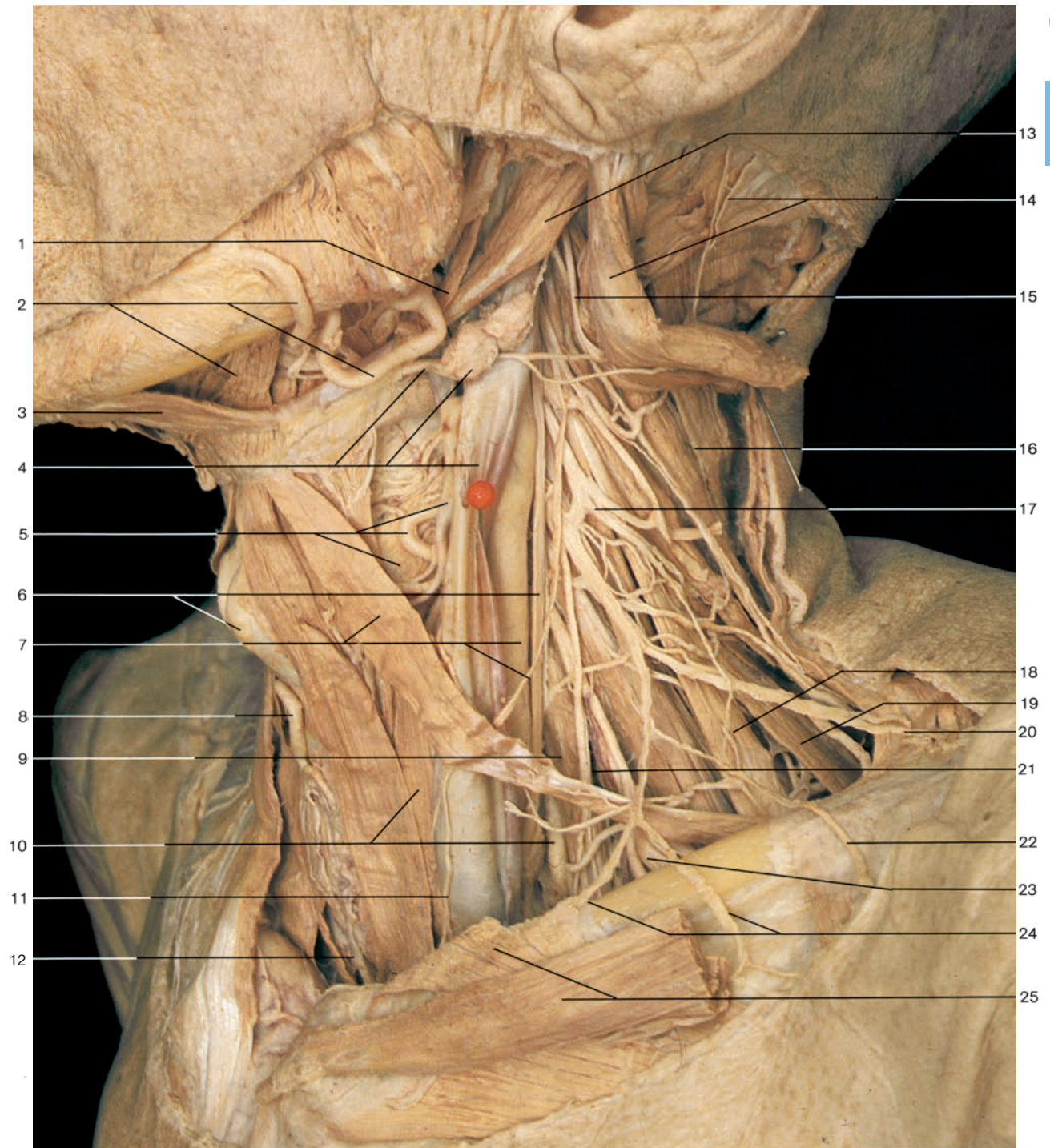
Lateral region of the neck with posterior and carotid triangles (superficial layer). The superficial lamina of cervical fascia has been removed to display the cutaneous branches of the cervical plexus and subcutaneous veins.

- | | |
|---|---|
| 1 Lesser occipital nerve | 15 Parotid gland |
| 2 Internal jugular vein | 16 Mandible |
| 3 Splenius capitis muscle | 17 Cervical branch of facial nerve |
| 4 Great auricular nerve | 18 Submandibular gland |
| 5 Submandibular nodes | 19 External carotid artery |
| 6 Internal carotid artery and vagus nerve | 20 Superior thyroid artery |
| 7 Accessory nerve | 21 Transverse cervical nerve |
| 8 Muscular branches of cervical plexus | 22 Superior root of ansa cervicalis |
| 9 External jugular vein | 23 Anterior jugular vein |
| 10 Posterior supraclavicular nerves | 24 Omohyoid muscle |
| 11 Middle supraclavicular nerves | 25 Sternohyoid muscle |
| 12 Suprascapular artery | 26 Sternocleidomastoid muscle |
| 13 Pretracheal lamina of fascia of neck | 27 Intermediate tendon of omohyoid muscle |
| 14 Clavicle | |



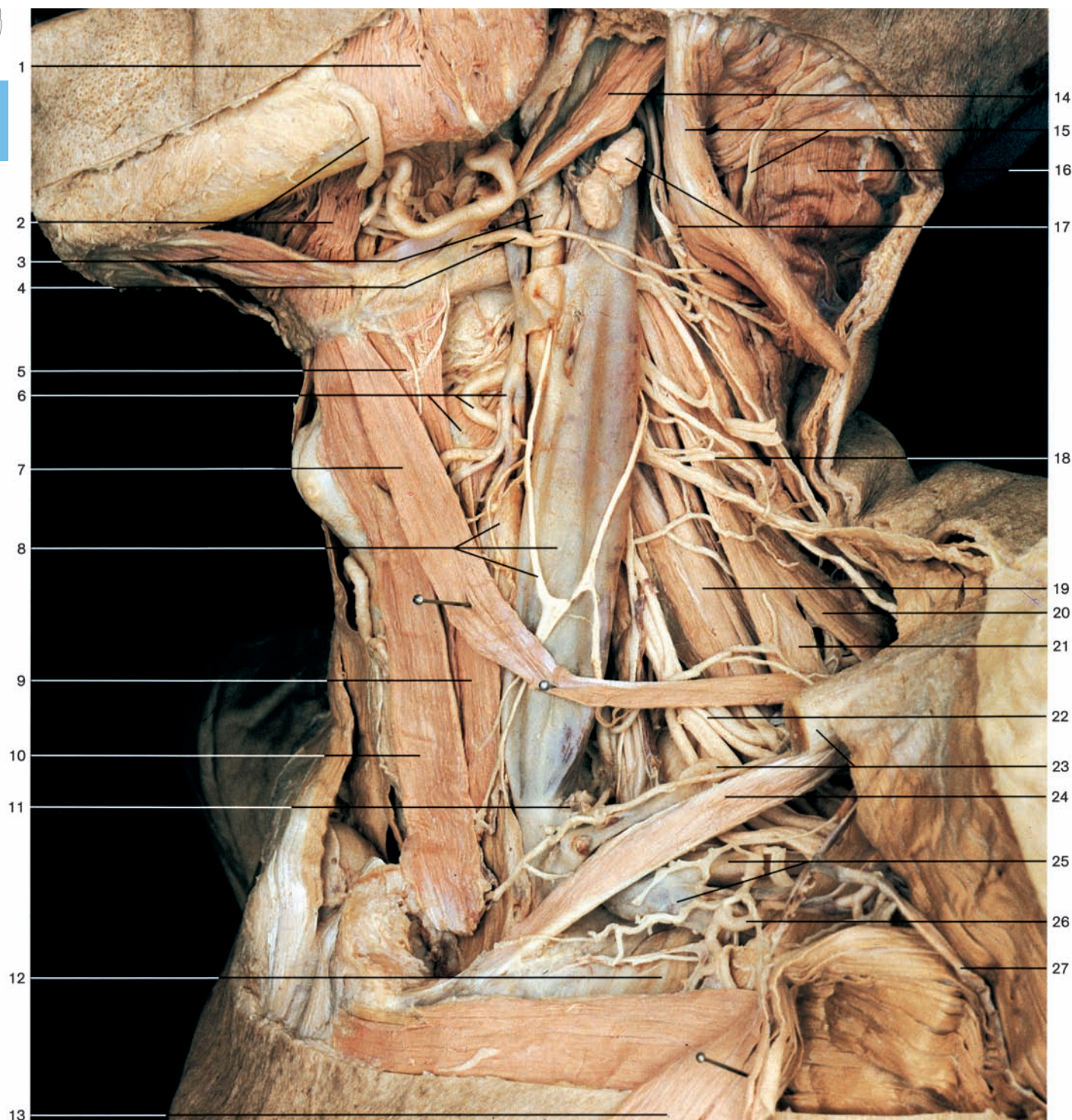
Lateral region of the neck (deep layer). Sternocleidomastoid muscle has been cut and reflected to display the pretracheal lamina of the cervical fascia.

- | | |
|--|--|
| 1 Sternocleidomastoid muscle (reflected) and branch of accessory nerve | 9 Great auricular nerve |
| 2 Facial artery | 10 Lesser occipital nerve |
| 3 External carotid artery and superior thyroid artery | 11 Splenius capitis and levator scapulae muscles |
| 4 Internal jugular vein | 12 Trapezius muscle |
| 5 Deep cervical lymph nodes and external jugular vein | 13 Middle scalene muscle and brachial plexus |
| 6 Omohyoid muscle and pretracheal lamina of cervical fascia | 14 Posterior supraclavicular nerves |
| 7 Anterior jugular vein | 15 Middle supraclavicular nerve |
| 8 Pectoralis major muscle | 16 Clavicle and anterior supraclavicular nerves |
| | 17 Sternocleidomastoid muscle (reflected) |



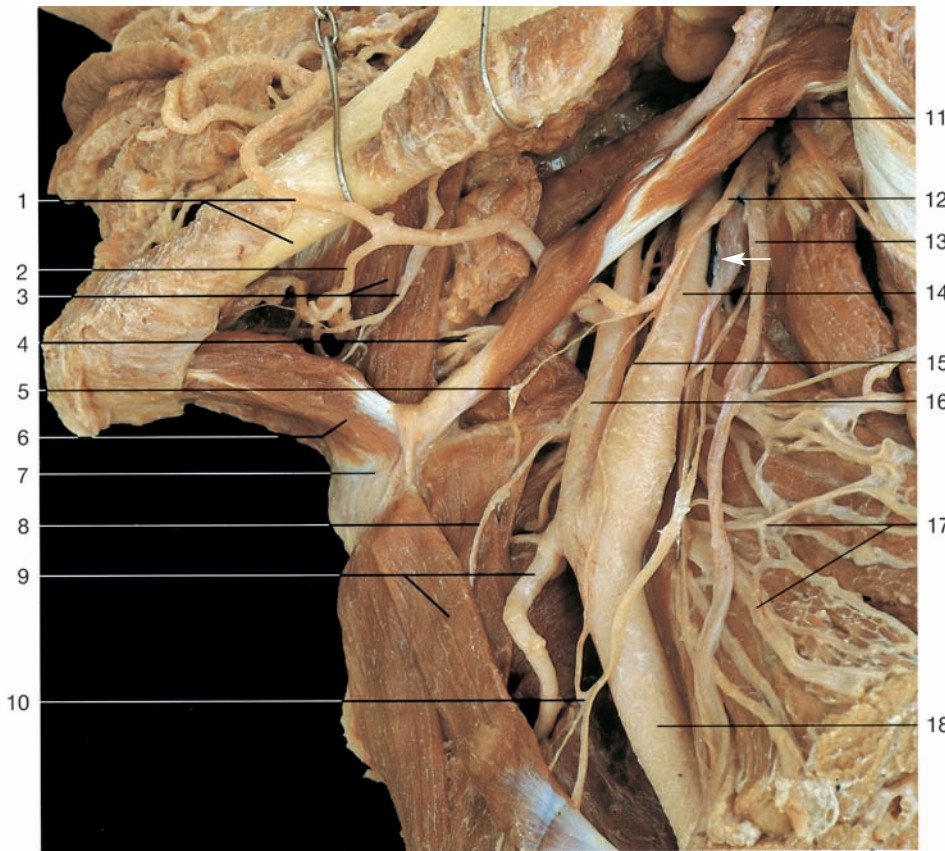
Lateral region of the neck (deep layer). The internal jugular vein has been reflected to expose the carotid artery and vagus nerve.

- | | |
|--|--|
| 1 Stylohyoid muscle | 13 Posterior belly of digastric muscle |
| 2 Facial artery and mylohyoid muscle | 14 Sternocleidomastoid muscle and lesser occipital nerve |
| 3 Anterior belly of digastric muscle | 15 Accessory nerve |
| 4 Internal jugular vein, hypoglossal nerve, and superficial cervical lymph nodes | 16 Splenius capitis muscle |
| 5 Superior thyroid artery and vein and inferior pharyngeal constrictor muscle | 17 Cervical plexus |
| 6 Thyroid cartilage and vagus nerve | 18 Posterior scalene muscle |
| 7 Ansa cervicalis, omohyoid muscle, and common carotid artery | 19 Levator scapulae muscle |
| 8 Right superior thyroid artery | 20 Posterior supraclavicular nerves |
| 9 Anterior scalene muscle | 21 Phrenic nerve |
| 10 Sternothyroid muscle and inferior thyroid artery | 22 Middle supraclavicular nerve |
| 11 Muscular branches of ansa cervicalis to the infrahyoid muscles | 23 Brachial plexus |
| 12 Inferior thyroid vein | 24 Anterior supraclavicular nerves |
| | 25 Sternocleidomastoid muscle |



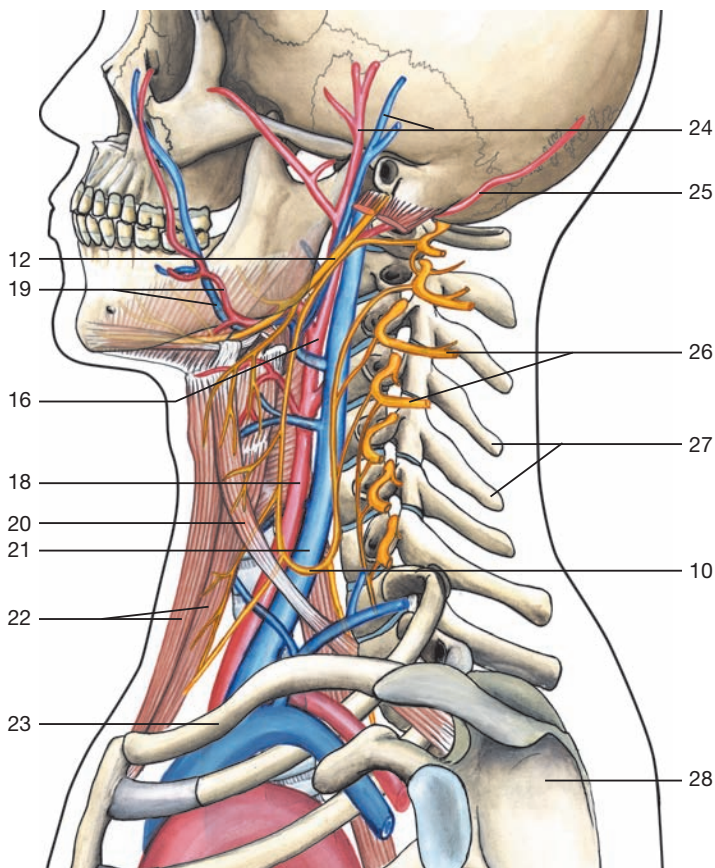
Lateral region of the neck with ansa cervicalis (deeper layer). The cervical fascia and the clavicle are partly removed. Ansa cervicalis and infrahyoid muscles are displayed.

- | | | |
|---|--|--|
| 1 Masseter muscle | 9 Sternothyroid muscle | 18 Cervical plexus |
| 2 Mylohyoid muscle and facial artery | 10 Sternohyoid muscle | 19 Middle scalene muscle |
| 3 External carotid artery and anterior belly of digastric muscle | 11 Thoracic duct | 20 Levator scapulae muscle |
| 4 Hypoglossal nerve | 12 Pectoralis minor muscle | 21 Posterior scalene muscle |
| 5 Thyrohyoid muscle | 13 Pectoralis major muscle | 22 Brachial plexus |
| 6 Superior thyroid artery and vein and inferior pharyngeal constrictor muscle | 14 Posterior belly of digastric muscle | 23 Transverse cervical artery and clavicle |
| 7 Superior belly of omohyoid muscle | 15 Sternocleidomastoid muscle and lesser occipital nerve | 24 Subclavius muscle |
| 8 Ansa cervicalis, thyroid gland, and internal jugular vein | 16 Splenius capitis muscle | 25 Subclavian artery and vein |
| | 17 Superficial cervical lymph nodes and accessory nerve | 26 Thoraco-acromial artery |
| | | 27 Cephalic vein |



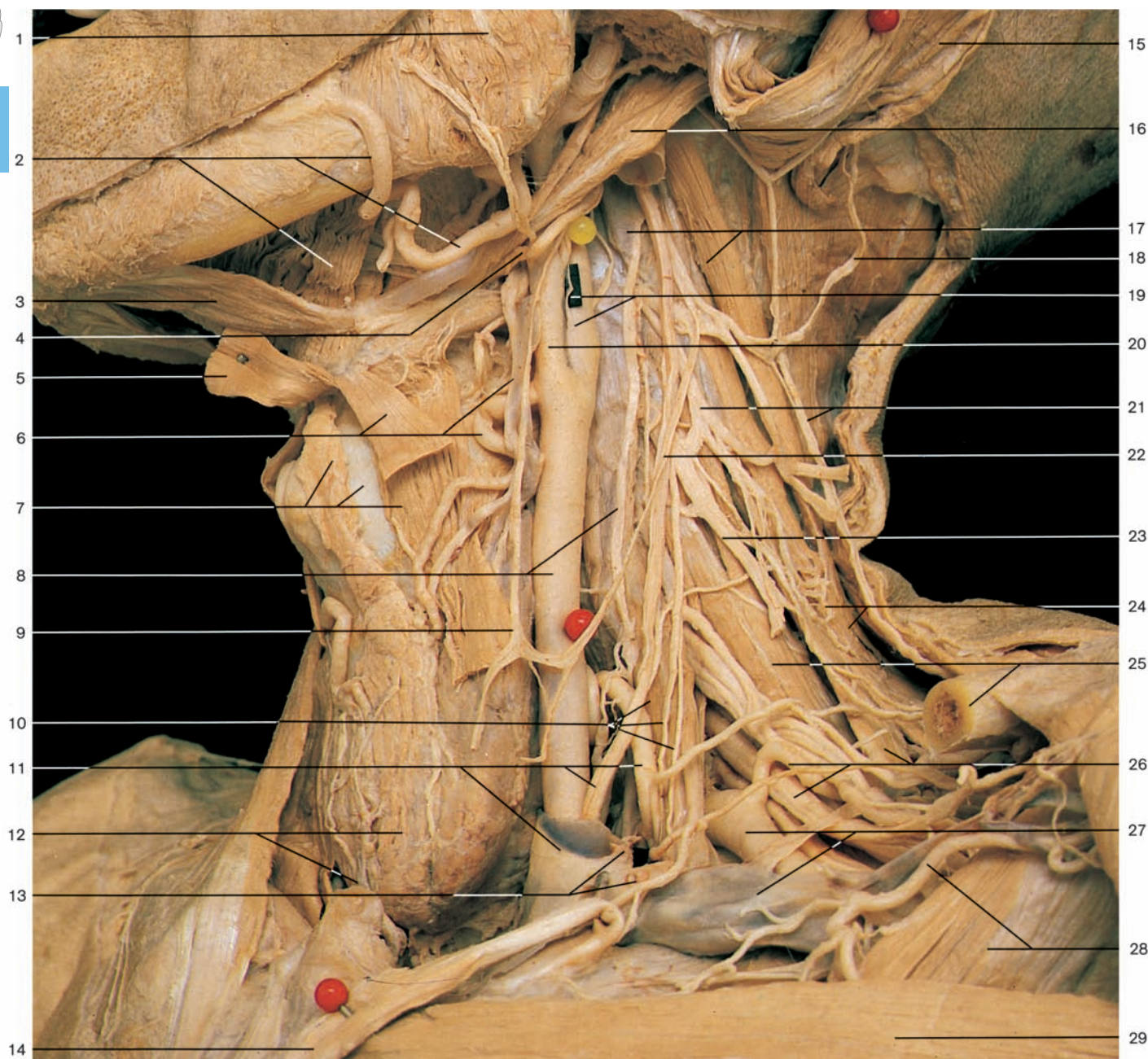
Lateral region of the neck and submandibular region with hypoglossal nerve (n. XII).
Mandible slightly elevated. Arrow: superior cervical ganglion.

- 1 Facial artery and mandible
- 2 Submental artery
- 3 Mylohyoid muscle and nerve
- 4 Hypoglossal nerve (lingual branches)
- 5 Thyrohyoid branch of hypoglossal nerve (n. XII)
- 6 Anterior belly of digastric muscle
- 7 Hyoid bone
- 8 Omohyoid branch of hypoglossal nerve (n. XII)
- 9 Omohyoid muscle and superior thyroid artery
- 10 Ansa cervicalis
- 11 Posterior belly of digastric muscle
- 12 Hypoglossal nerve (n. XII)
- 13 Vagus nerve (n. X)
- 14 Internal carotid artery
- 15 Superior root of ansa cervicalis
- 16 External carotid artery
- 17 Cervical plexus
- 18 Common carotid artery
- 19 Facial artery and vein
- 20 Omohyoid muscle
- 21 Internal jugular vein
- 22 Sternohyoid and sternothyroid muscles
- 23 Clavicle
- 24 Superficial temporal artery and vein
- 25 Occipital artery
- 26 Spinal nerves (C₃ and C₄)
- 27 Spinal processes of cervical vertebrae (C₄ and C₅)
- 28 Scapula



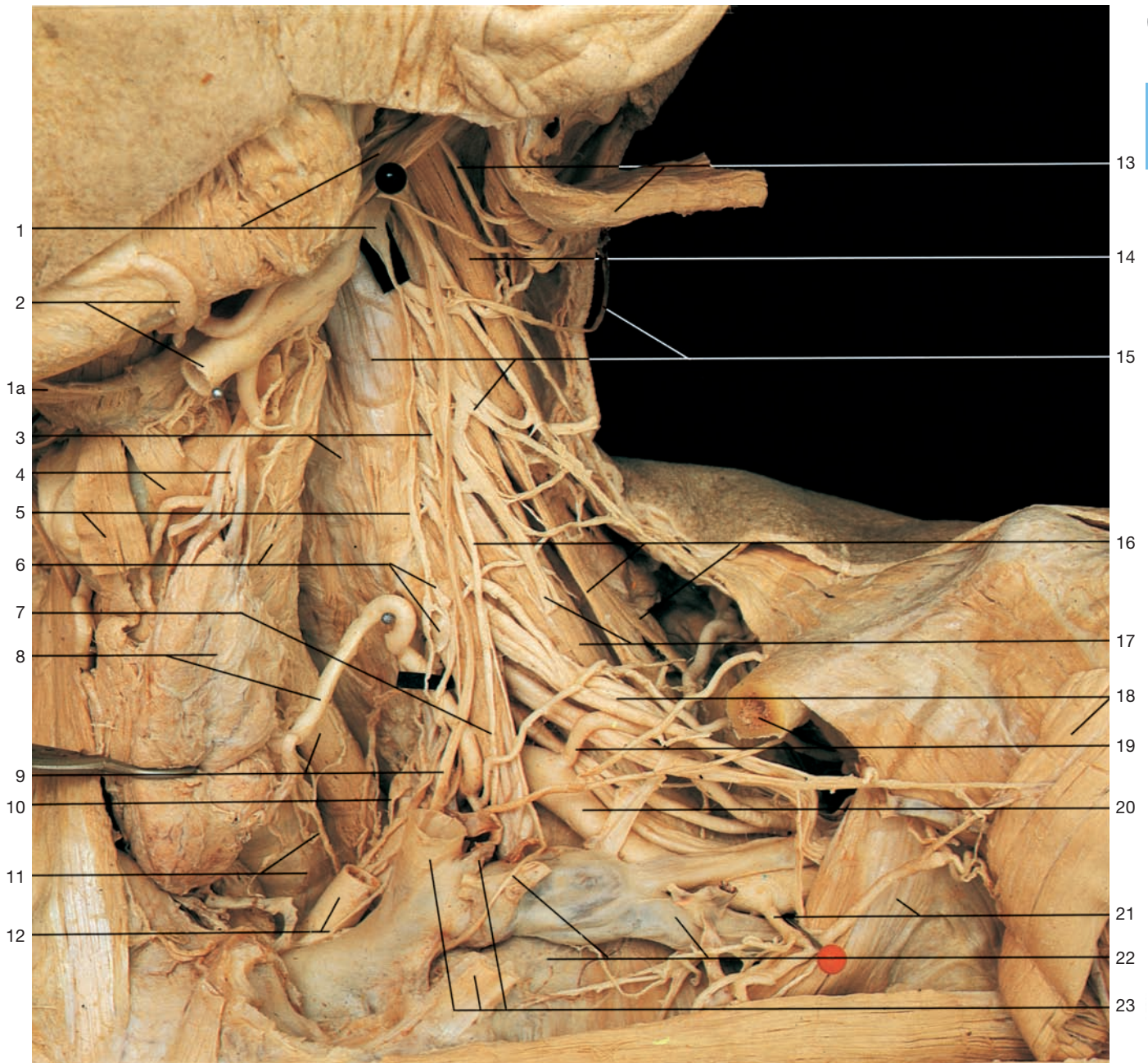
Nerves and vessels of the neck (lateral aspect).

The ansa cervicalis with its connection to the spinal nerves is depicted.



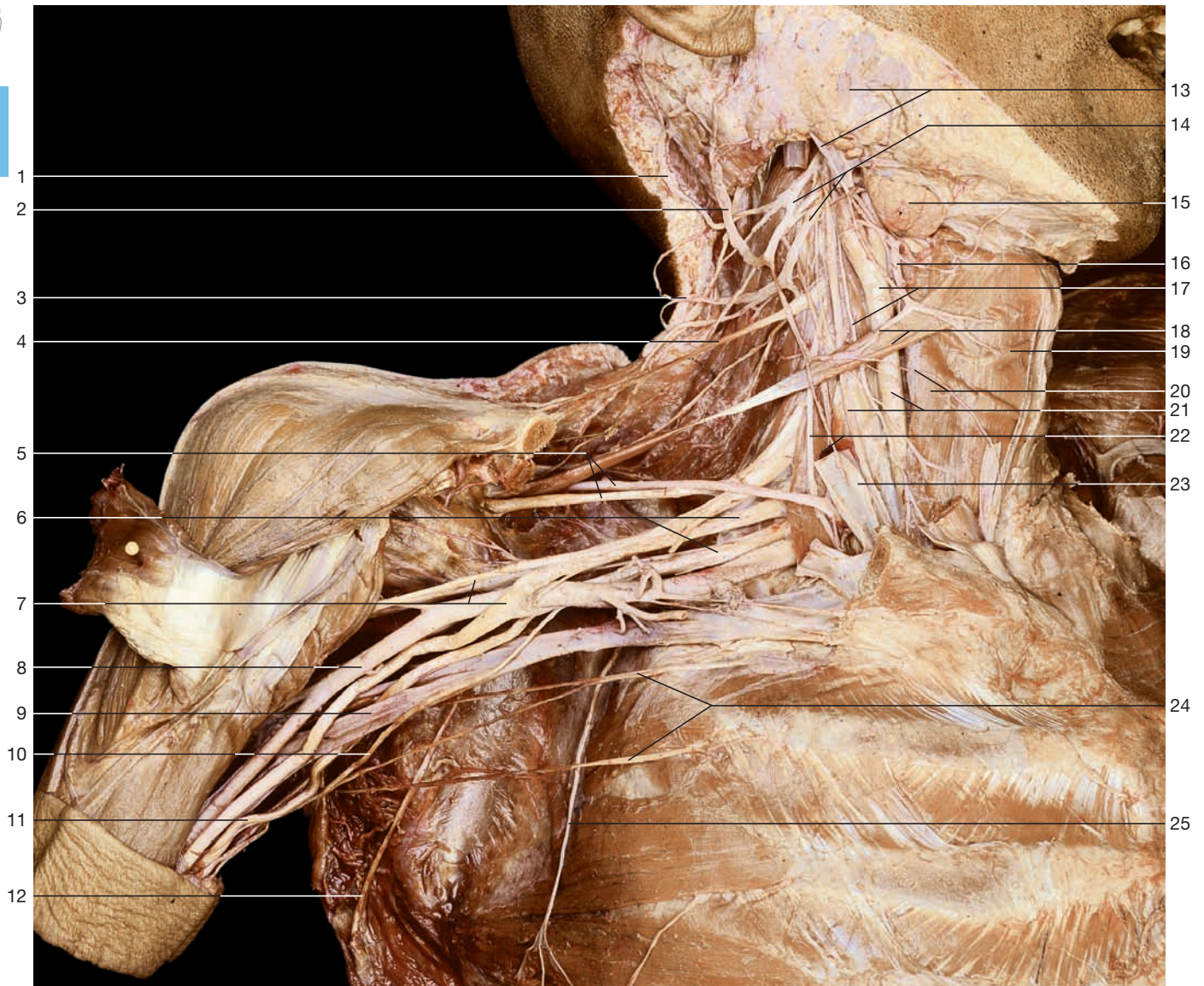
Lateral region of the neck (deeper layer). Clavicle partly removed to show the slit between the scalene muscles. Internal jugular vein removed.

- | | | |
|--|---|--|
| 1 Masseter muscle | 11 Inferior thyroid artery, vagus nerve, and internal jugular vein (cut) | 21 Cervical plexus and accessory nerve |
| 2 Mylohyoid muscle and facial artery | 12 Thyroid gland and unpaired inferior thyroid venous plexus | 22 Inferior root of ansa cervicalis |
| 3 Anterior belly of digastric muscle | 13 Thoracic duct and left subclavian trunk | 23 Supraclavicular nerve |
| 4 Hypoglossal nerve | 14 Subclavius muscle (reflected) | 24 Levator scapulae muscle |
| 5 Sternohyoid muscle | 15 Sternocleidomastoid muscle (reflected) | 25 Middle scalene muscle and clavicle |
| 6 Omohyoid muscle, superior thyroid artery and vein | 16 Posterior belly of digastric muscle | 26 Transverse cervical artery, brachial plexus, and posterior scalene muscle |
| 7 Sternothyroid muscle, thyroid cartilage, and pyramidal lobe of thyroid gland | 17 Superior cervical ganglion and splenius muscle | 27 Subclavian artery and vein |
| 8 Common carotid artery and sympathetic trunk | 18 Lesser occipital nerve | 28 Thoraco-acromial artery and pectoralis minor muscle |
| 9 Ansa cervicalis | 19 Internal carotid artery and branch of the glossopharyngeal nerve to the carotid body | 29 Pectoralis major muscle |
| 10 Phrenic nerve, ascending cervical artery, and anterior scalene muscle | 20 External carotid artery | |



Lateral region of the neck (deepest layer). Thyroid gland reflected to expose the esophagus and the recurrent laryngeal nerve.

- | | |
|---|---|
| 1 Superior cervical ganglion of sympathetic trunk and posterior belly of digastric muscle | 12 Common carotid artery and cervical cardiac branch of vagus nerve |
| 1a Anterior belly of digastric muscle | 13 Sternocleidomastoid muscle and accessory nerve |
| 2 Facial artery and common carotid artery (reflected anteriorly) | 14 Splenius capitis muscle |
| 3 Ascending cervical artery and longus colli muscle | 15 Lesser occipital nerve, longus capitis muscle, and cervical plexus |
| 4 Omohyoid muscle and superior thyroid artery | 16 Phrenic nerve, posterior scalene muscle, and levator scapulae muscle |
| 5 Sympathetic trunk and sternohyoid muscle | 17 Supraclavicular nerves and middle scalene muscle |
| 6 Middle cervical ganglion and inferior pharyngeal constrictor muscle | 18 Brachial plexus and pectoralis major muscle (clavicular head) |
| 7 Anterior scalene muscle and phrenic nerve | 19 Transverse cervical artery and clavicle |
| 8 Thyroid gland and inferior thyroid artery | 20 Subclavian artery |
| 9 Vagus nerve and esophagus | 21 Thoraco-acromial artery and pectoralis minor muscle |
| 10 Stellate ganglion | 22 First rib, accessory phrenic nerve, and subclavian vein |
| 11 Recurrent laryngeal nerve and trachea | 23 Internal jugular vein, thoracic duct, and subclavius muscle |



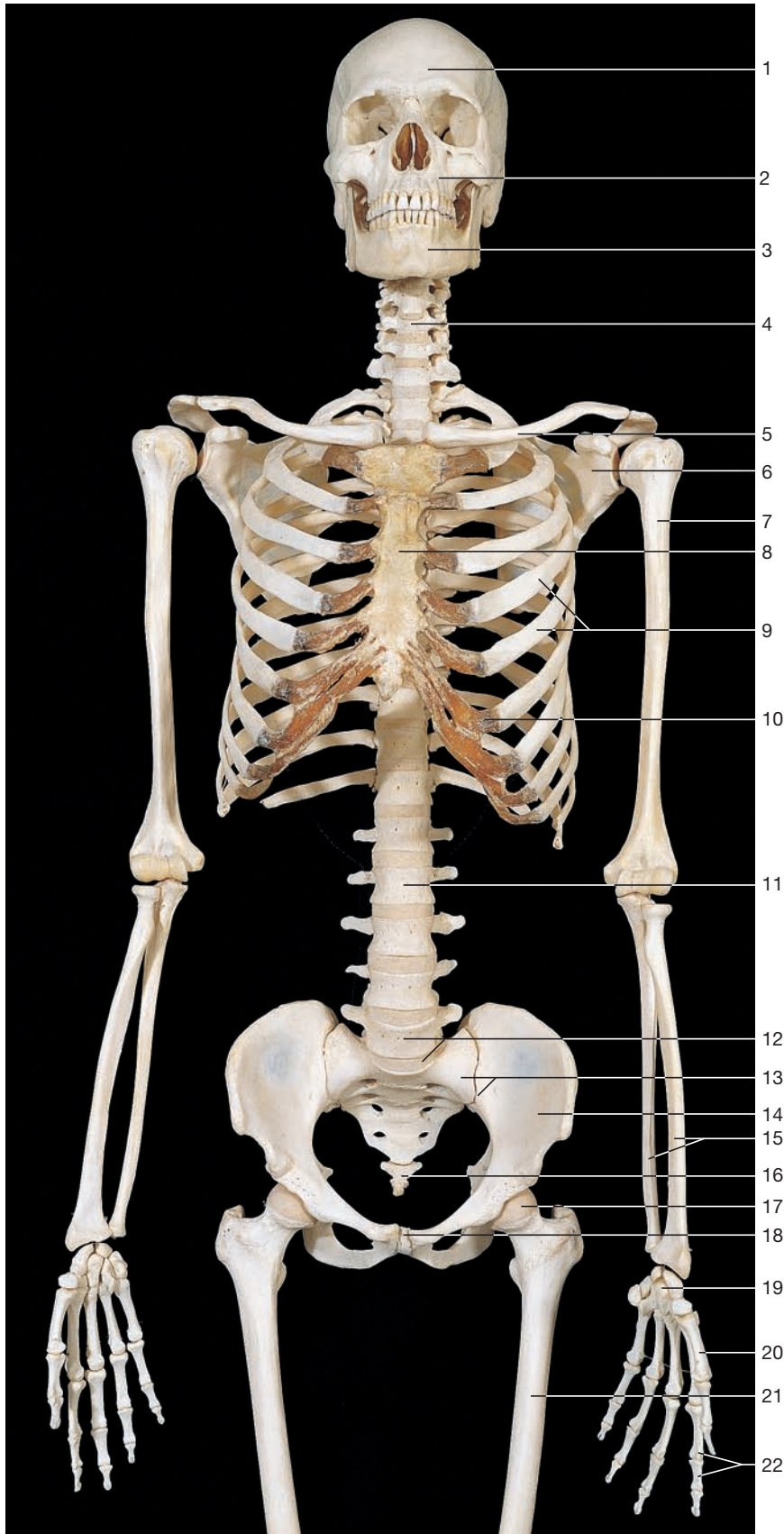
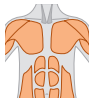
Lateral region of the neck and shoulder (deepest layer). Cervical and brachial plexuses and their relation to the blood vessels are shown. Note the location and content of scalene triangle. Sternocleidomastoid muscle and clavicle have been removed; the internal jugular vein was divided to display the roots of cervical and brachial plexuses.

- | | |
|--|---|
| 1 Lesser occipital nerve | 15 Submandibular gland |
| 2 Great auricular nerve | 16 Superior thyroid artery |
| 3 Cutaneous branches of cervical plexus | 17 Common carotid artery dividing in internal and external carotid artery and superior root of ansa cervicalis |
| 4 Supraclavicular nerve | 18 Omohyoid muscle and cervical branch of facial nerve joining the transverse cervical nerve (C ₂ , C ₃) |
| 5 Suprascapular nerve and artery | 19 Sternohyoid muscle |
| 6 Brachial plexus | 20 Transverse cervical nerve and sternothyroid muscle |
| 7 Median nerve (with two roots) and musculocutaneous nerve | 21 Common carotid artery and vagus nerve |
| 8 Axillary artery | 22 Phrenic nerve and anterior scalene muscle |
| 9 Axillary vein | 23 Internal jugular vein |
| 10 Medial brachial cutaneous nerve | 24 Intercostobrachial nerves |
| 11 Ulnar nerve | 25 Long thoracic nerve |
| 12 Thoracodorsal nerve | |
| 13 Parotid gland and facial nerve (cervical branch) | |
| 14 Cervical plexus | |

3 Trunk

Skeleton _____	190	Inguinal Region _____	221
Head and Vertebral Column _____	193	Surface Anatomy of the Back _____	225
Vertebrae _____	198	Back _____	226
Thorax and Vertebral Column _____	201	Spinal Cord _____	234
Ligaments of the Vertebral Column _____	206	Lumbar Part of the Vertebral Column	
Surface Anatomy of the Anterior Body _____	208	and Spinal Cord _____	238
Thoracic Wall _____	210	Vertebral Canal and Spinal Cord _____	240
Thoracic and Abdominal Walls _____	212	Nuchal Region _____	242



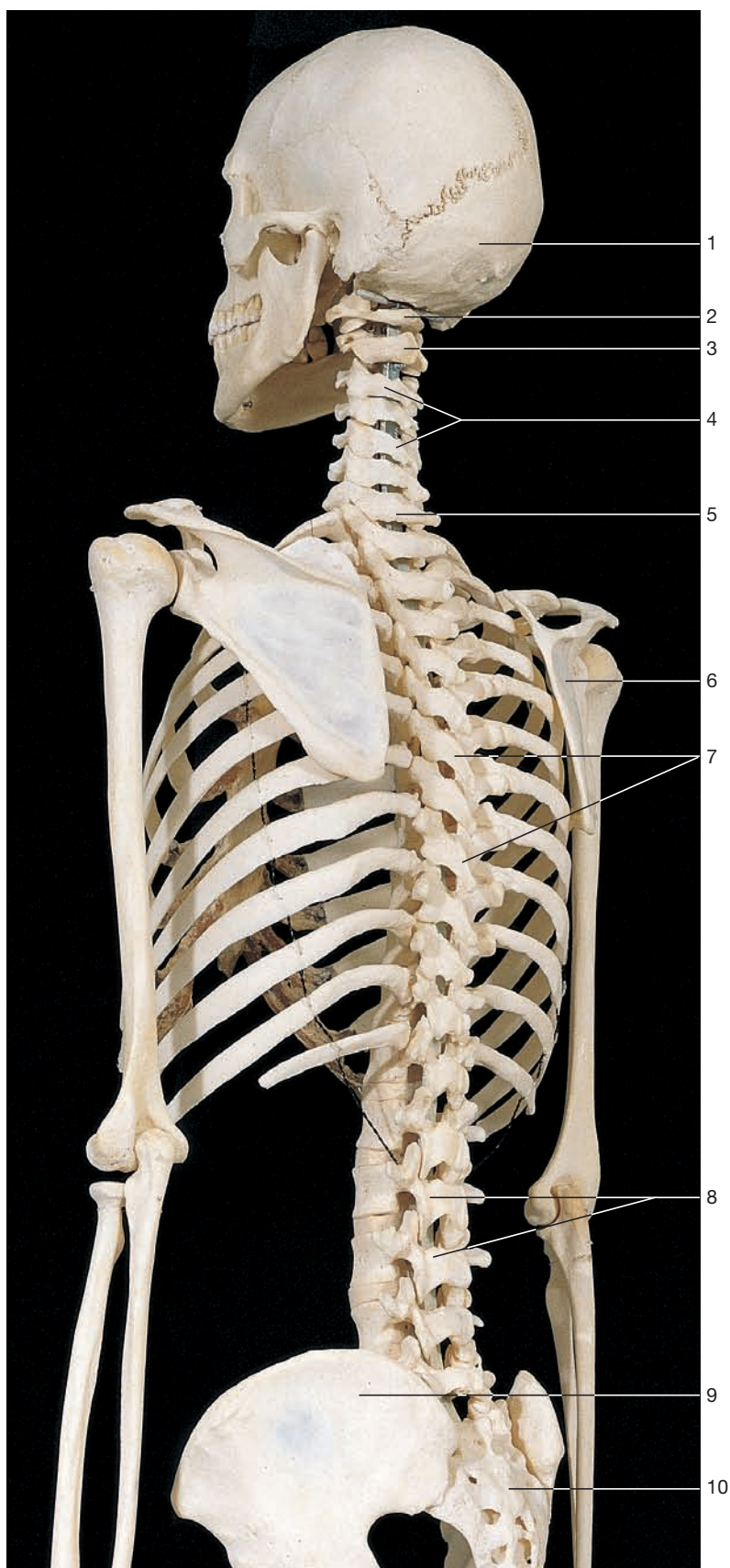


- 1 Frontal bone
- 2 Maxilla
- 3 Mandible
- 4 Cervical vertebrae
- 5 Clavicle
- 6 Scapula
- 7 Humerus
- 8 Sternum
- 9 Ribs
- 10 Costal cartilage
- 11 Lumbar vertebrae
- 12 Lumbar vertebra (L₅) and promontory
- 13 Sacrum
- 14 Hip bone
- 15 Radius and ulna
- 16 Coccyx
- 17 Head of femur
- 18 Pubic symphysis
- 19 Carpal bones
- 20 Metacarpal bones
- 21 Femur
- 22 Phalanges

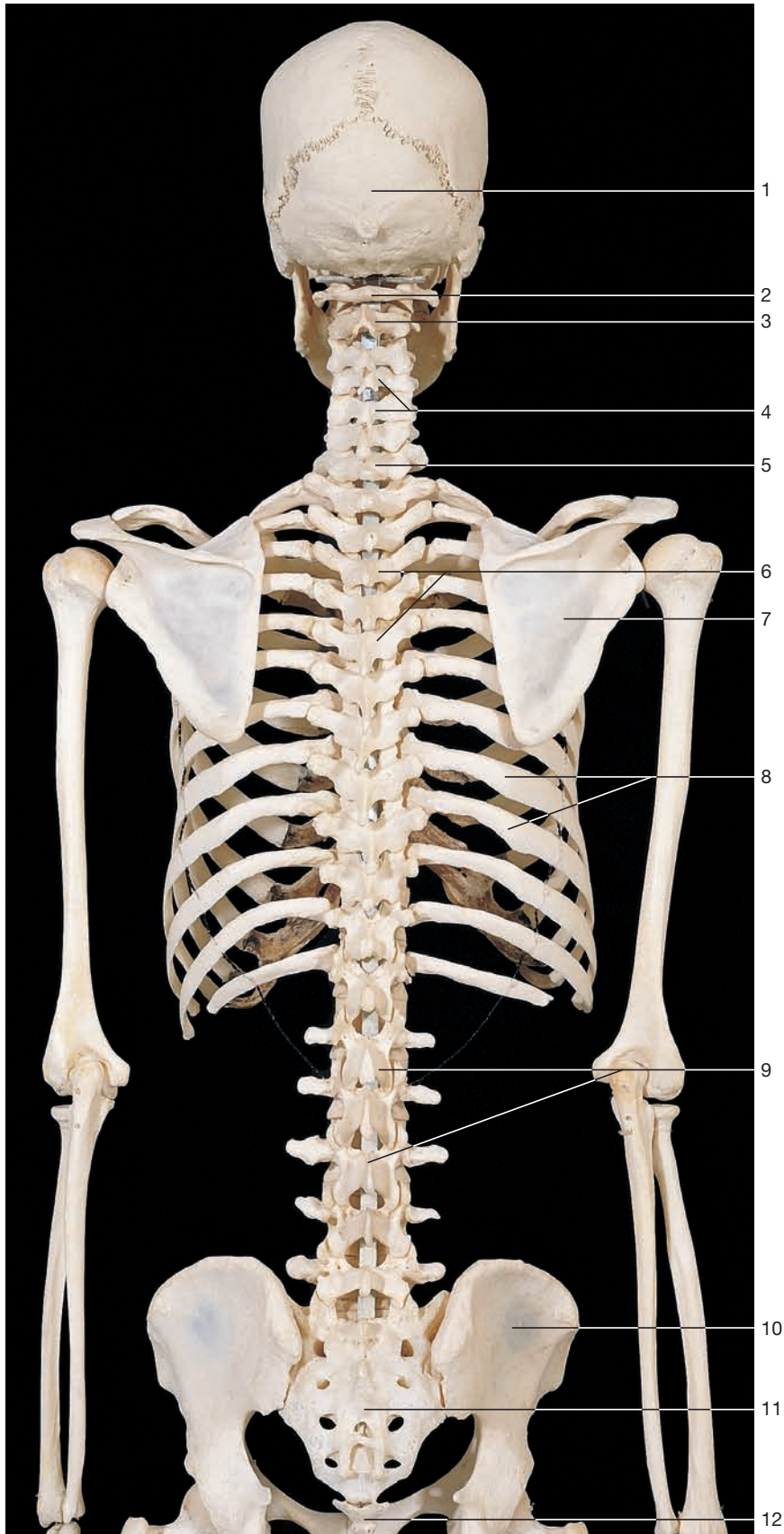
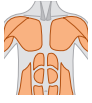
Skeleton of the trunk with head, vertebral column, thorax, pelvis, and upper limb (anterior aspect).



- 1 Occipital bone
- 2 Atlas
- 3 Axis
- 4 Cervical vertebrae
- 5 Vertebra prominens (C₇)
- 6 Scapula
- 7 Thoracic vertebrae
- 8 Lumbar vertebrae
- 9 Hip bone
- 10 Sacrum

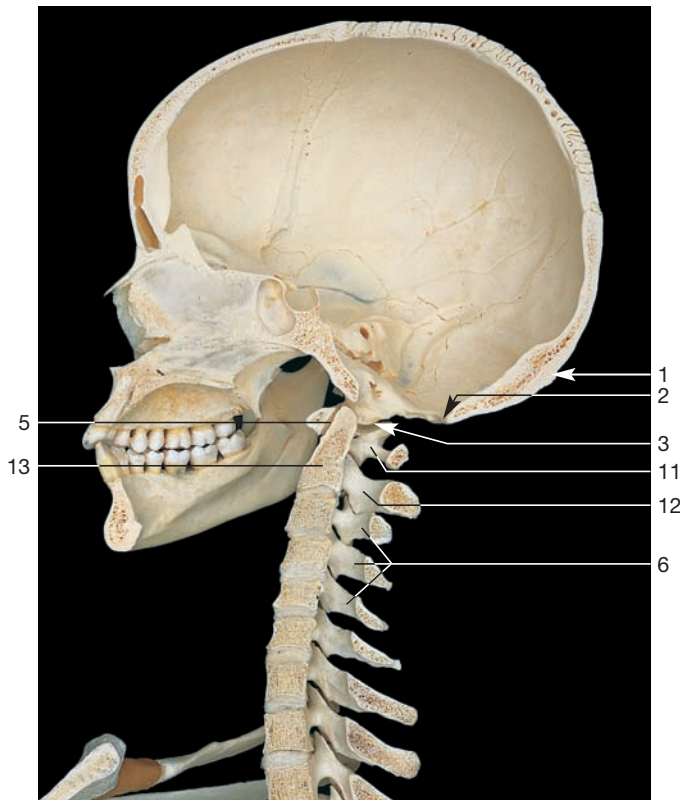


Skeleton of the trunk with head, vertebral column, thorax, pelvis, and shoulder girdle (oblique-posterior aspect).



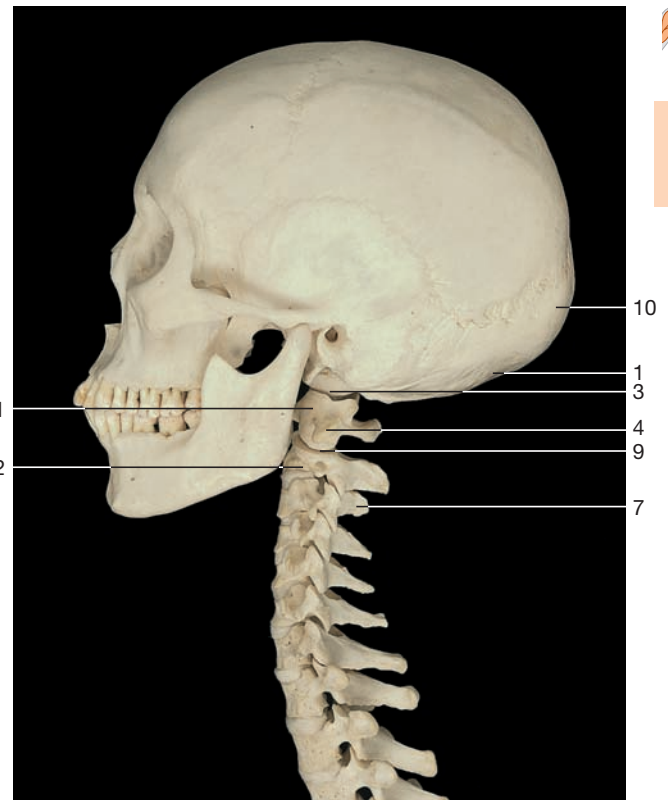
- 1 Occipital bone
- 2 Atlas
- 3 Axis
- 4 Cervical vertebrae
- 5 Vertebra prominens (C₇)
- 6 Thoracic vertebrae
- 7 Scapula
- 8 Ribs
- 9 Lumbar vertebrae
- 10 Hip bone
- 11 Sacrum
- 12 Coccyx

Skeleton of the trunk with head, vertebral column, thorax, pelvis, and shoulder girdle (posterior aspect).



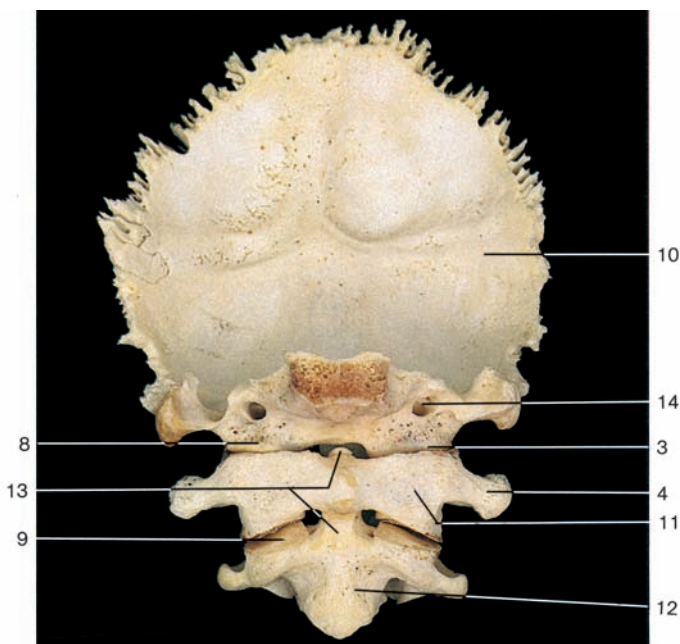
Cervical vertebral column in relation to the head
(midsagittal section, medial aspect).

- 1 External occipital protuberance
- 2 Foramen magnum
- 3 Atlanto-occipital joint
- 4 Transverse process of atlas
- 5 Median atlanto-axial joint
- 6 Vertebral canal
- 7 Spinous process of third cervical vertebra
- 8 Occipital condyle



Atlas and axis in relation to the head (lateral aspect).

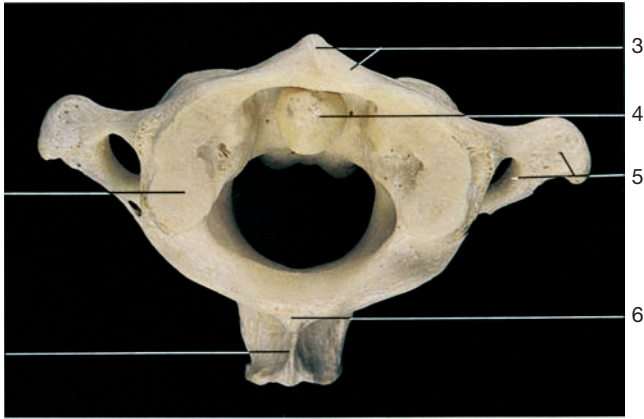
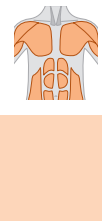
- 9 Lateral atlanto-axial joint
- 10 Occipital bone
- 11 Atlas
- 12 Axis
- 13 Dens of axis
- 14 Hypoglossal canal
- 15 Spinous process of axis



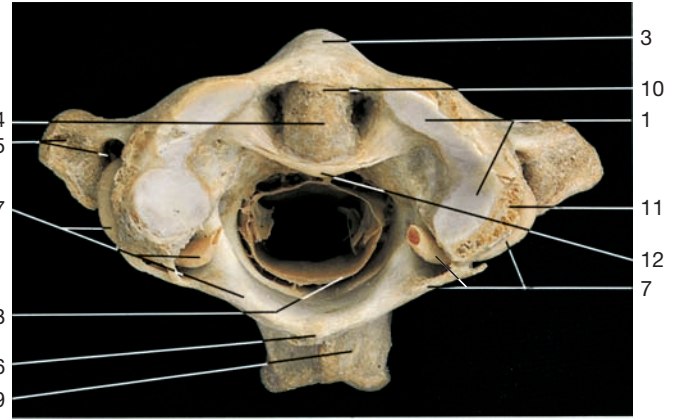
Occipital bone, atlas, and axis (anterior aspect).



Occipital bone, atlas, and axis (left lateral aspect).



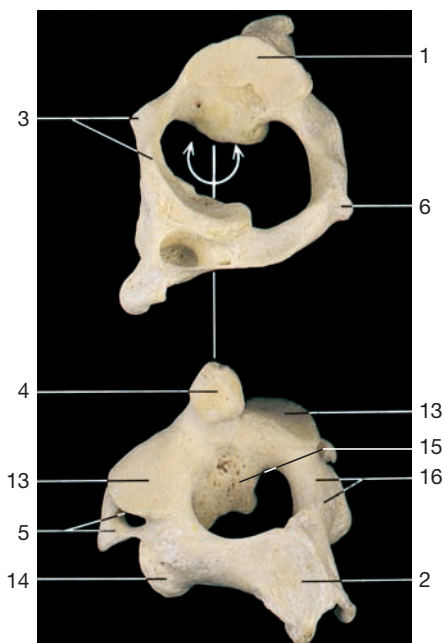
Atlas and axis (from above).



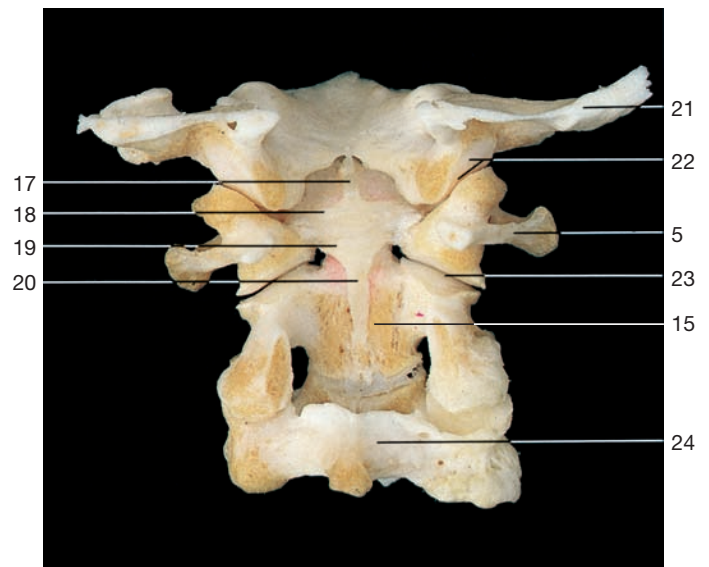
Median atlanto-axial joint and transverse ligament of atlas (from above). Dens of axis partly severed.

- 1 Superior articular facet of atlas
- 2 Spinous process
- 3 Anterior arch of atlas with anterior tubercle
- 4 Dens of axis
- 5 Transverse foramen and process
- 6 Posterior tubercle of atlas
- 7 Posterior arch of atlas and vertebral artery
- 8 Dura mater
- 9 Spinous process of axis
- 10 Median atlanto-axial joint (anterior part)
- 11 Articular capsule of atlanto-occipital joint
- 12 Transverse ligament of atlas

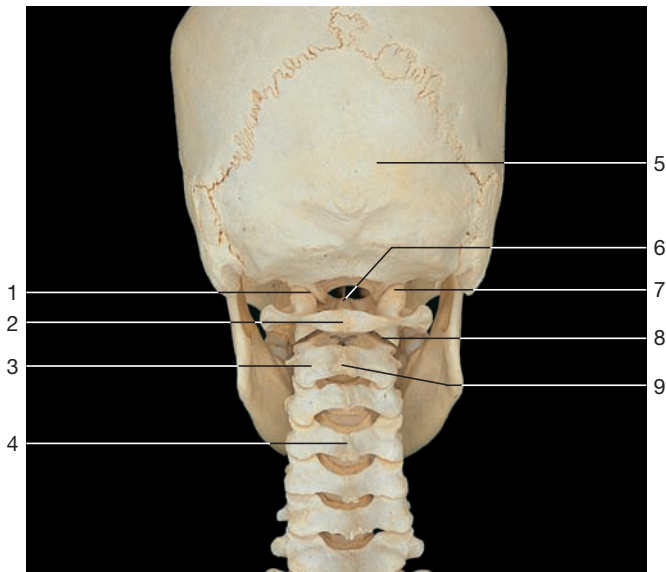
- 13 Superior articular facet of axis
- 14 Inferior articular process
- 15 Body of axis
- 16 Pedicle and lamina of axis
- 17 Superior longitudinal band of cruciform ligament
- 18 Alar ligaments
- 19 Transverse ligament of atlas
- 20 Inferior longitudinal band of cruciform ligament
- 21 Occipital bone
- 22 Atlanto-occipital joint
- 23 Lateral atlanto-axial joint
- 24 Third cervical vertebra (C₃)



Atlas and axis (left oblique postero-lateral aspect, demonstrating the articulation of the dens of axis with the atlas [arrows]).

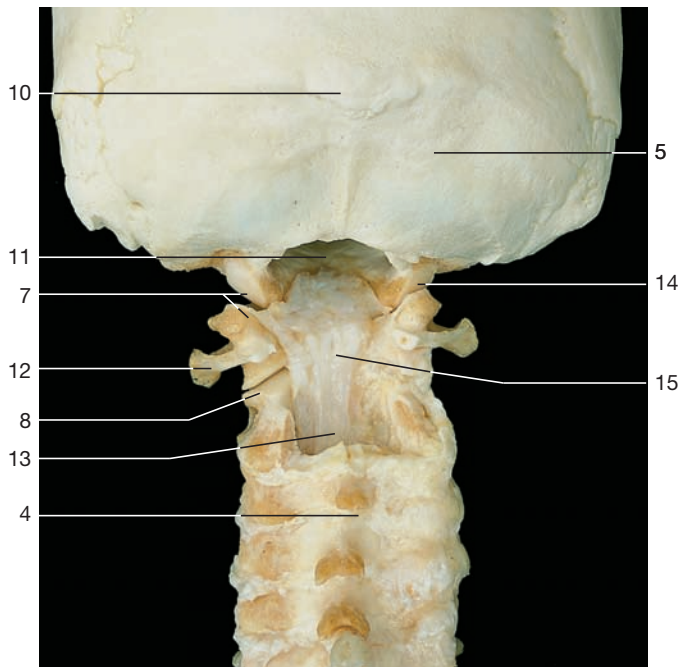


Atlanto-occipital and atlanto-axial joints (posterior aspect). Posterior part of occipital bone, posterior arch of atlas, and axis have been removed to show the cruciform ligament.

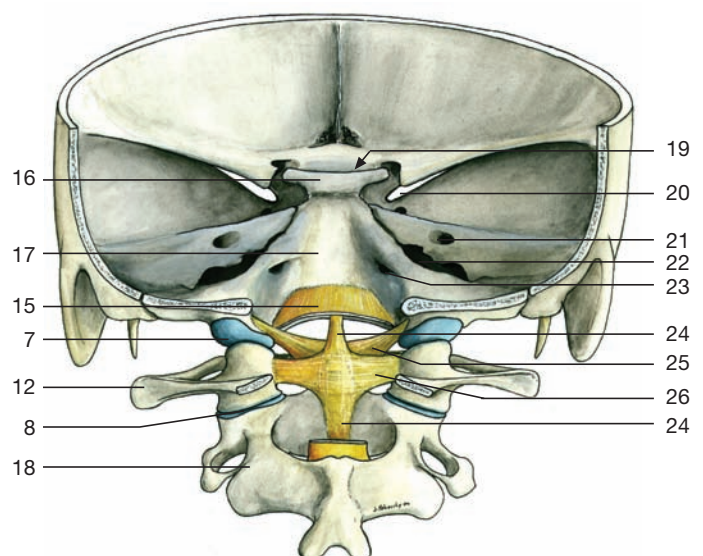


Cervical vertebral column and skull (posterior aspect). Note the location of the atlanto-occipital and atlanto-axial joints.

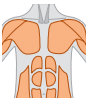
- 1 Superior articular facet
- 2 Posterior tubercle of atlas
- 3 Pedicle and lamina of axis
- 4 Spinous process of cervical vertebra
- 5 Occipital bone
- 6 Dens of axis
- 7 Atlanto-occipital joint
- 8 Lateral atlanto-axial joint
- 9 Spinous process of axis
- 10 External occipital protuberance
- 11 Foramen magnum
- 12 Transverse process of atlas
- 13 Posterior longitudinal ligament
- 14 Occipital condyle
- 15 Tectorial membrane
- 16 Dorsum sellae
- 17 Clivus
- 18 Axis
- 19 Sella turcica
- 20 Superior orbital fissure
- 21 Internal acoustic meatus
- 22 Jugular foramen
- 23 Hypoglossal canal
- 24 Superior longitudinal band of cruciform ligament
- 25 Alar ligaments
- 26 Transverse ligament of atlas



Cervical vertebral column and skull with ligaments (posterior aspect). Posterior arches of atlas and axis have been removed to show the tectorial membrane.

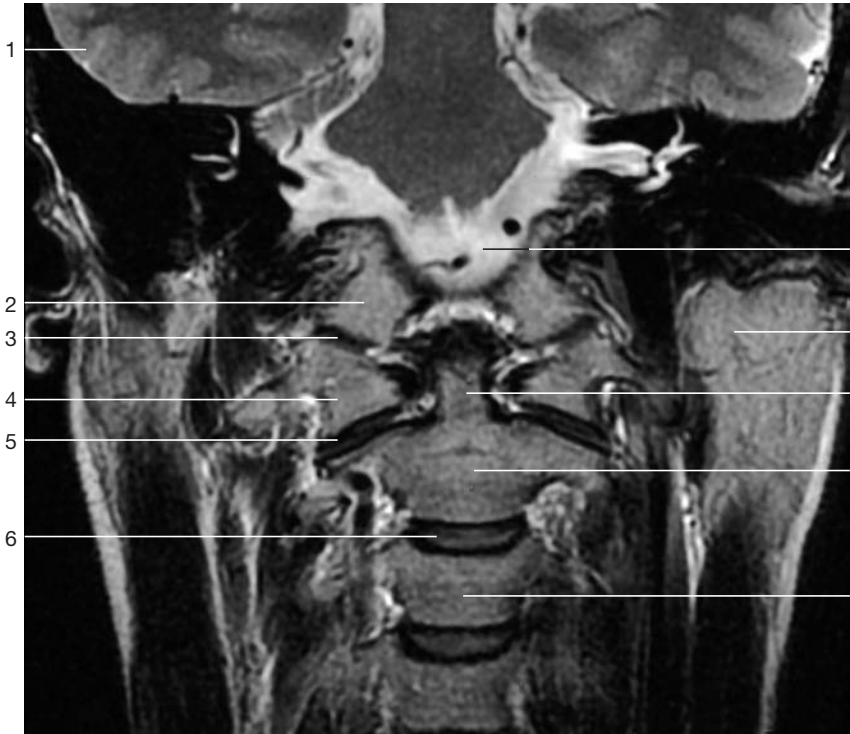


Atlanto-occipital and atlanto-axial joints with ligaments (posterior aspect). Posterior part of occipital bone and posterior arch of atlas have been removed to show the cruciform ligament.



- 1 Atlas
- 2 Dens of axis
- 3 Axis
- 4 Body of cervical vertebra (C₃)
- 5 Intervertebral discs
- 6 Sternocleidomastoid muscle
- 7 Scalene muscles

Coronal section through the cervical vertebral column at the level of the vertical bodies (MRI scan). (Courtesy of Prof. Heuck, Munich, Germany.)



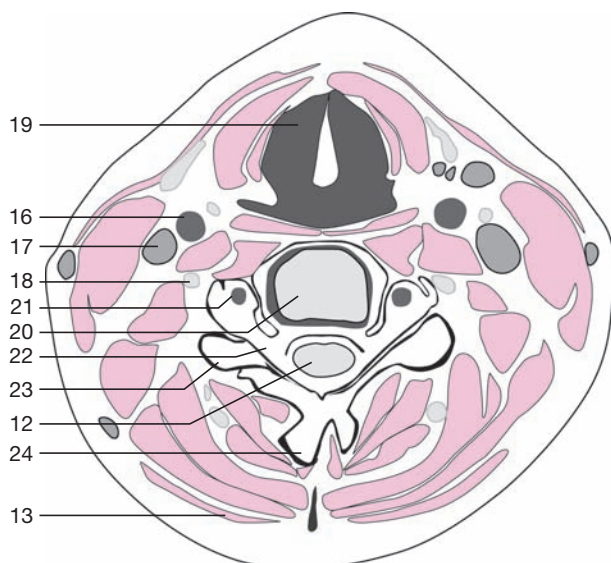
- 1 Cerebellum
- 2 Occipital condyle
- 3 Atlanto-occipital joint
- 4 Atlas
- 5 Lateral atlanto-axial joint
- 6 Intervertebral disc
- 7 Cistern of pons
- 8 Head of mandible
- 9 Dens of axis
- 10 Axis
- 11 Body of cervical vertebra (C₃)

Coronal section through the cervical vertebral column at the level of the dens of axis (MRI scan). (Courtesy of Prof. Heuck, Munich, Germany.)

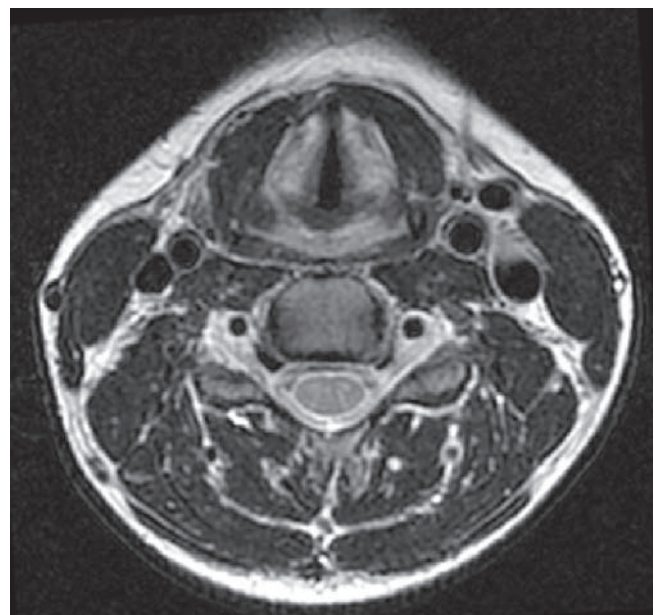
- 1 Pons
- 2 Base of skull (clivus)
- 3 Medulla oblongata
- 4 Atlas (anterior arch)
- 5 Dens of axis
- 6 Intervertebral disc
- 7 Body of cervical vertebra (C₄)
- 8 Site of larynx
- 9 Trachea
- 10 Cerebellum
- 11 Cerebellomedullary cistern
- 12 Spinal cord
- 13 Trapezius muscle
- 14 Muscles of the neck
- 15 Spinous process of cervical vertebra (C₇)
- 16 Internal jugular vein
- 17 Common carotid artery
- 18 Vagus nerve (n. X)
- 19 Larynx
- 20 Body of cervical vertebra
- 21 Vertebral artery
- 22 Spinal nerve with spinal ganglion
- 23 Transverse process of cervical vertebra
- 24 Spinous process of cervical vertebra

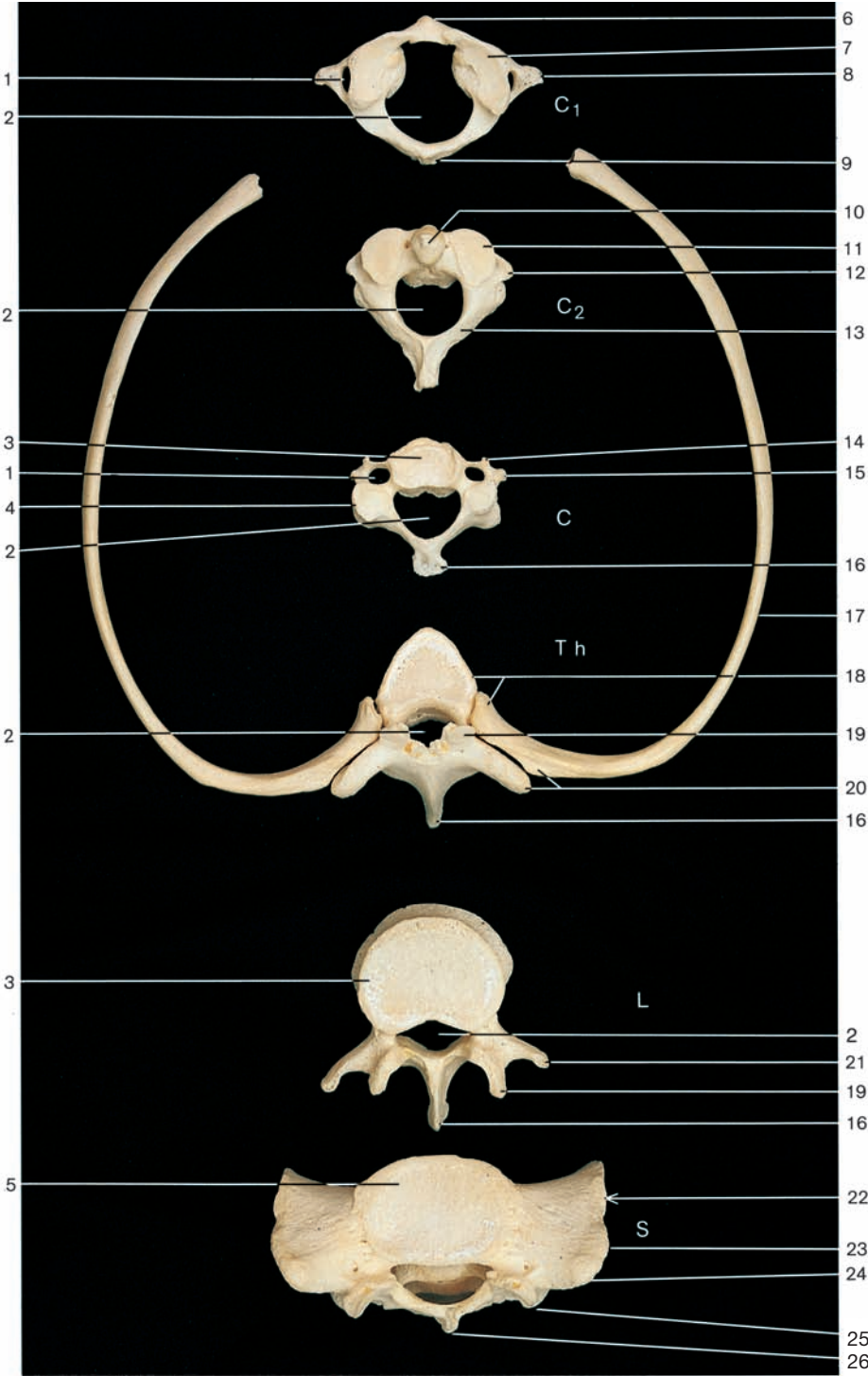
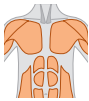


Midsagittal section through the cervical vertebral column showing the spinal cord in connection with the medulla oblongata (MRI scan). (Courtesy of Prof. Heuck, Munich, Germany.)

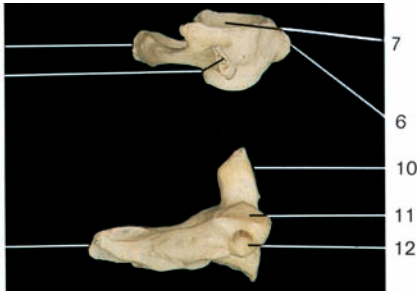


Horizontal section through the neck at the level of the larynx (MRI scan). (Courtesy of Prof. Heuck, Munich, Germany.) Compare with the schematic drawing.

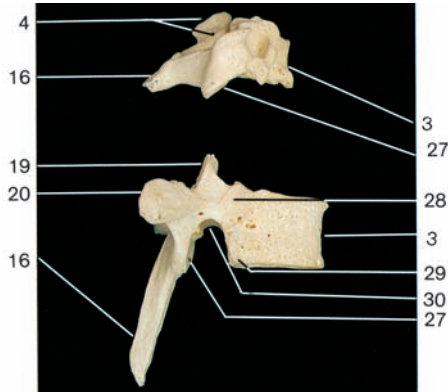




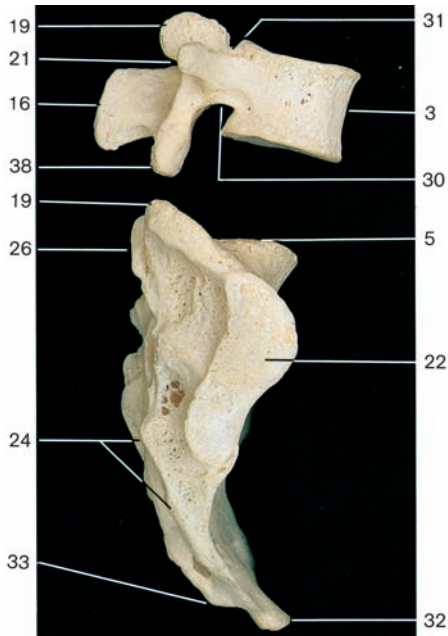
Representative vertebrae from each region of the vertebral column (superior aspect). From top to bottom: atlas (C₁), axis (C₂), cervical vertebra (C), thoracic vertebra (Th), lumbar vertebra (L), and sacrum (S).



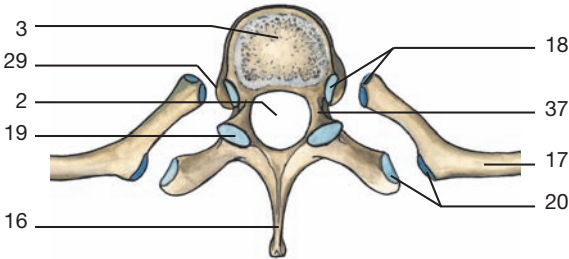
Atlas and axis.



Typical cervical and thoracic vertebrae.

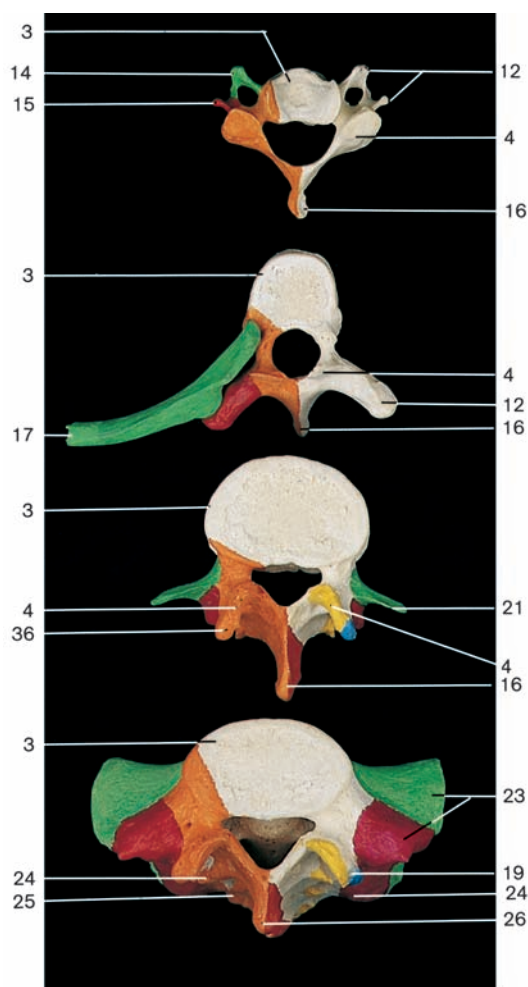


Typical lumbar vertebra and sacrum.

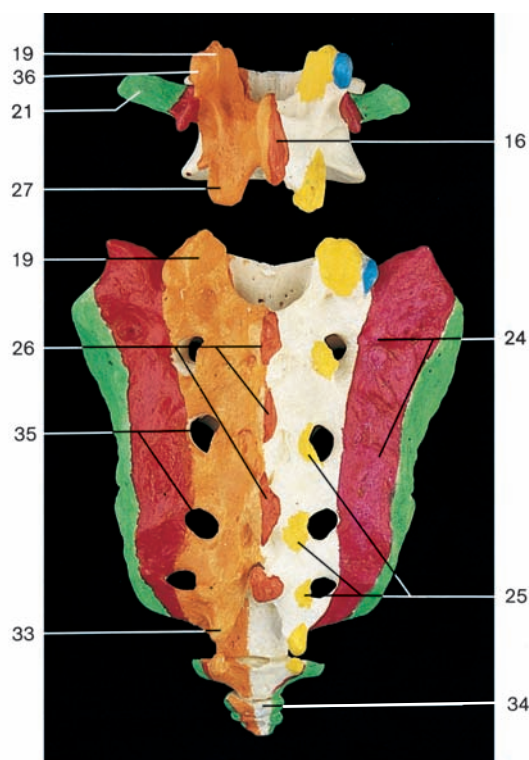


General organization of ribs and vertebrae.

△ **Representative vertebrae from each region of the vertebral column** (lateral aspect, ventral surface on the right).



General characteristics of the vertebrae.
Typical cervical, thoracic, and lumbar vertebrae and sacrum.

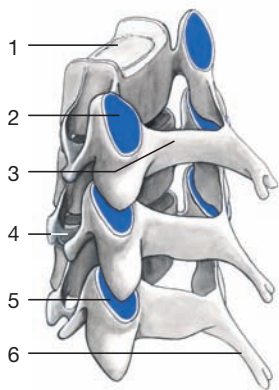
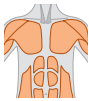


General characteristics of lumbar vertebrae and sacrum (posterior aspect).

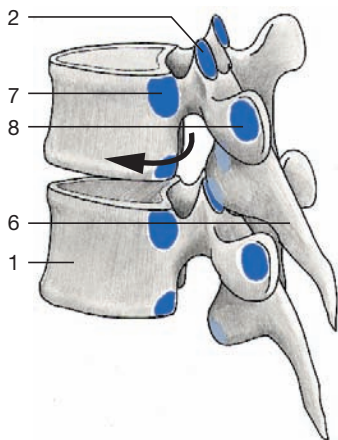
Green = Ribs or homologous processes
Red = Muscular processes
(transverse and spinous processes)
Orange = Laminae and articular processes
Yellow = Articular facets
and blue

- 1 Foramen transversarium
- 2 Vertebral foramen
- 3 Body of vertebra
- 4 Superior articular facet
- 5 Base of sacrum
- 6 Anterior tubercle of atlas
- 7 Superior articular facet of atlas
- 8 Transverse process
- 9 Posterior tubercle of atlas
- 10 Dens of axis
- 11 Superior articular surface
- 12 Transverse process
- 13 Arch of vertebra
- 14 Anterior tubercle of transverse process
- 15 Posterior tubercle of transverse process
- 16 Spinous process
- 17 Shaft of rib
- 18 Body of vertebra and head of rib articulating with each other (costovertebral joint)
- 19 Superior articular process

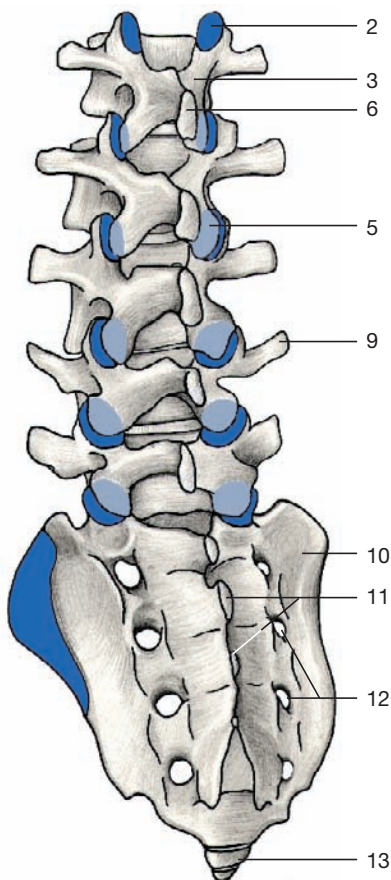
- 20 Transverse process and tubercle of rib articulating with each other (costotransverse joint)
- 21 Costal process
- 22 Auricular surface
- 23 Lateral part of sacrum
- 24 Lateral sacral crest
- 25 Intermediate sacral crest
- 26 Median sacral crest
- 27 Inferior articular facet
- 28 Superior demifacet for head of rib
- 29 Inferior demifacet for head of rib
- 30 Inferior vertebral notch
- 31 Superior vertebral notch
- 32 Apex of the sacrum
- 33 Sacral cornu
- 34 Coccyx
- 35 Dorsal sacral foramina
- 36 Mamillary process
- 37 Pedicle
- 38 Inferior articular process



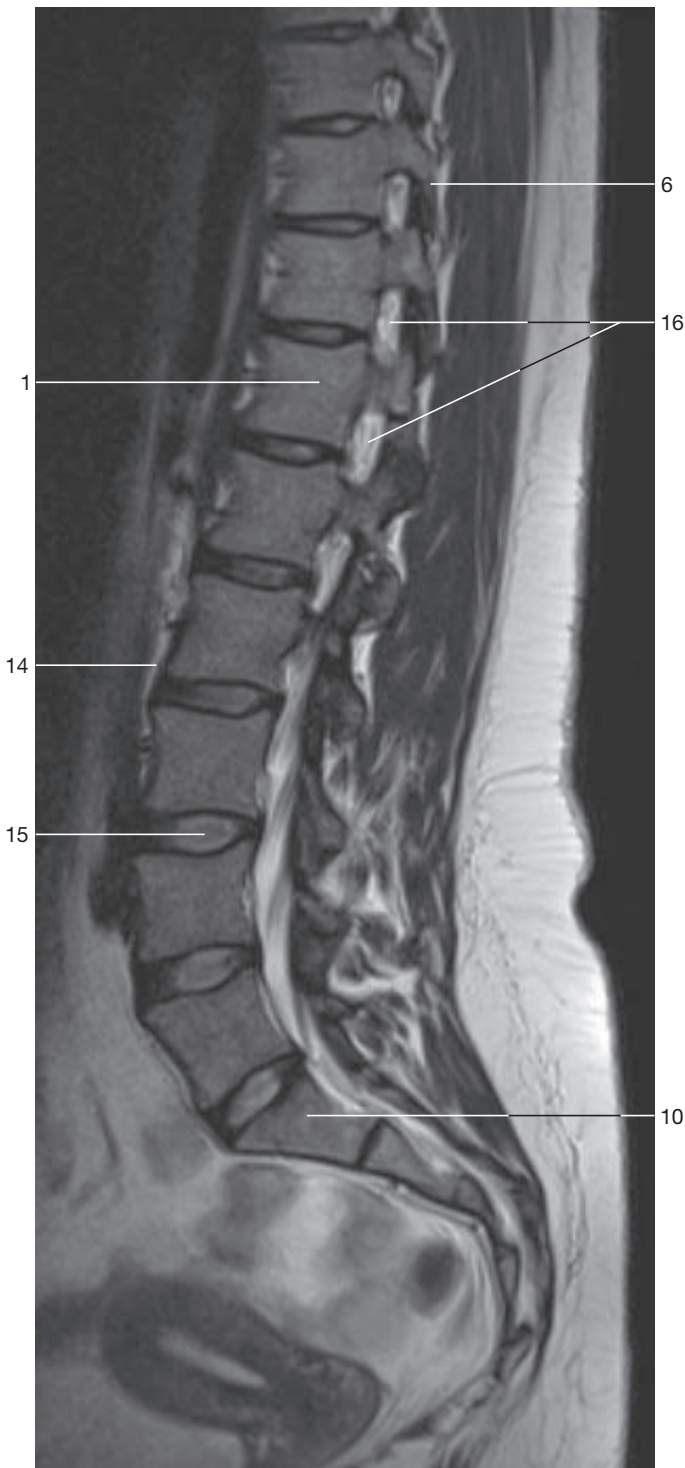
Cervical vertebrae (lateral aspect, blue = articular facets).



Thoracic vertebrae (lateral aspect, blue = articular facets).

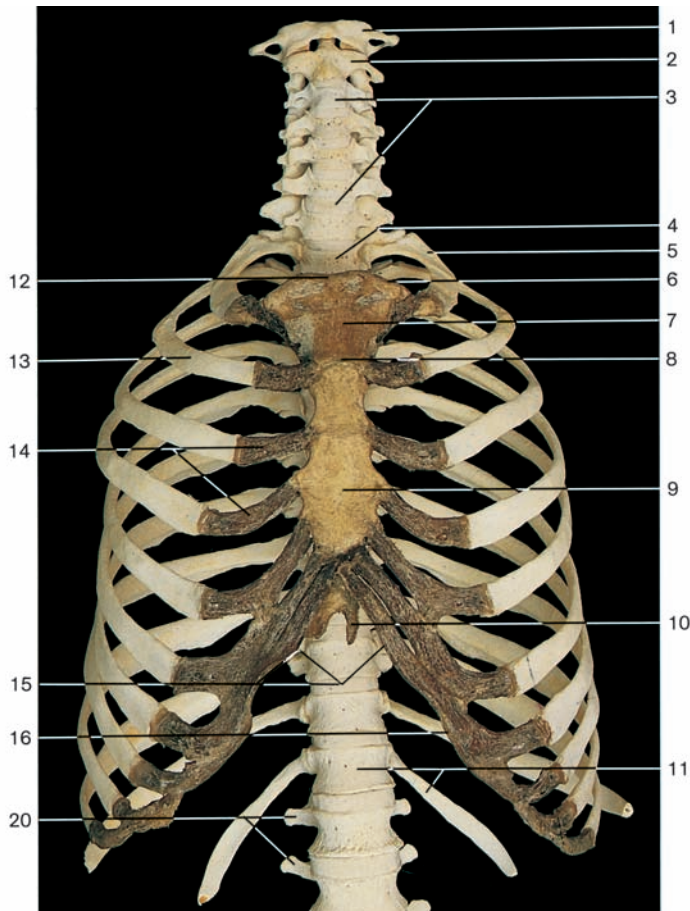


Lumbar vertebrae with sacrum and coccyx (posterior aspect, blue = articular facets).

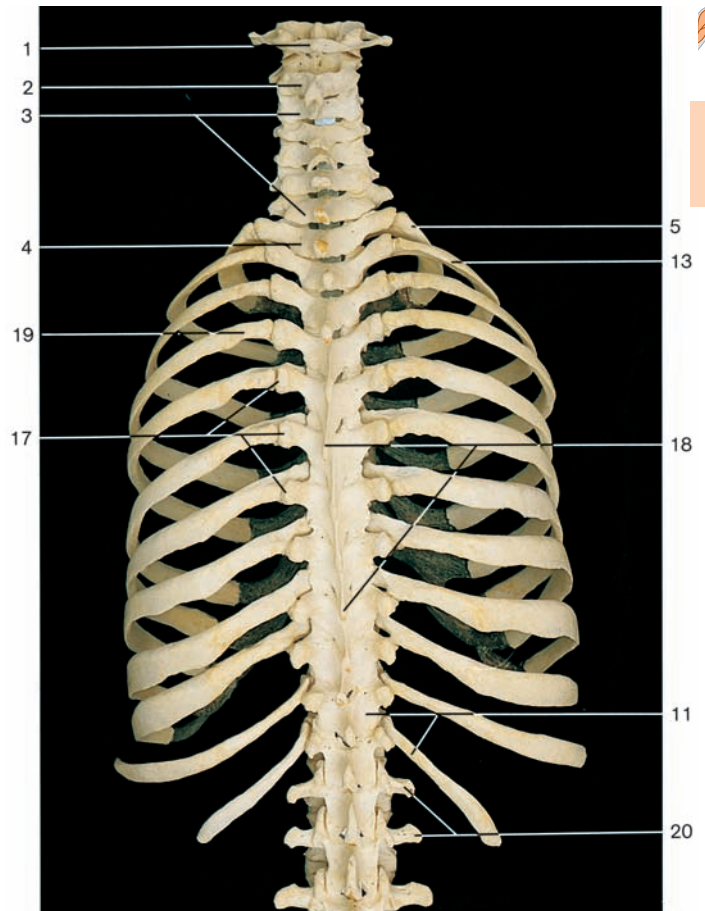


Paramedian section through the vertebral column with pelvic cavity (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

- | | |
|--|--|
| 1 Body of vertebra | 8 Transverse process with articular facet of costotransverse joint |
| 2 Superior articular facet | 9 Costal process of lumbar vertebra |
| 3 Vertebral arch | 10 Sacrum |
| 4 Transverse process of vertebra | 11 Median sacral crest |
| 5 Zygapophysial joint | 12 Dorsal sacral foramina |
| 6 Spinous process | 13 Coccyx |
| 7 Superior articular facet of articulation with head of ribs | 14 Anterior longitudinal ligament |
| | 15 Intervertebral disc |
| | 16 Vertebral canal |

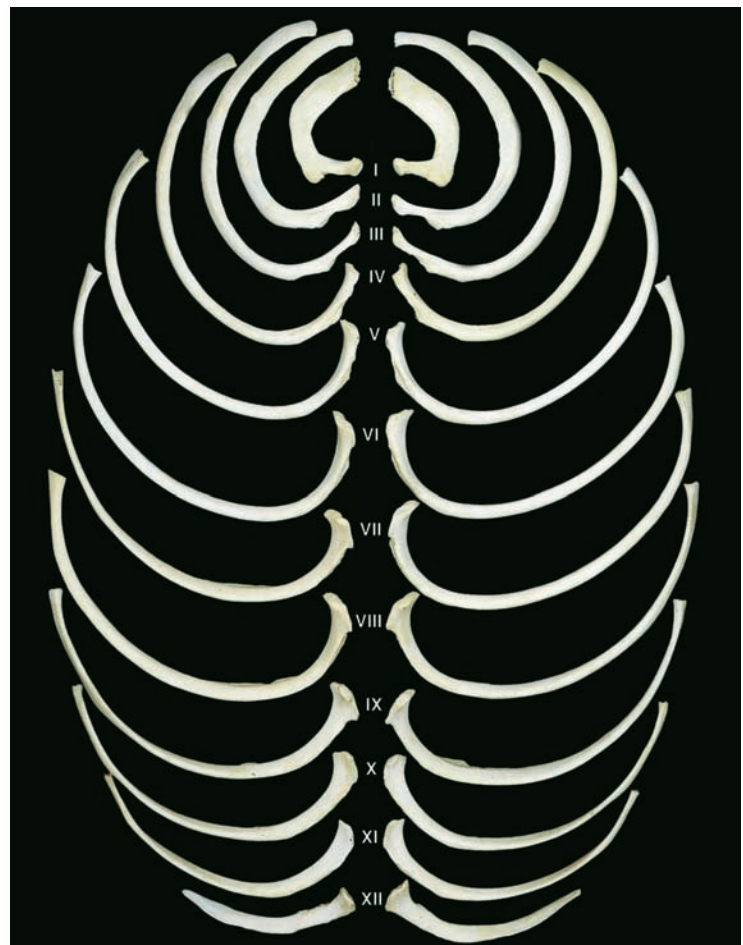


Skeleton of the thorax (anterior aspect).



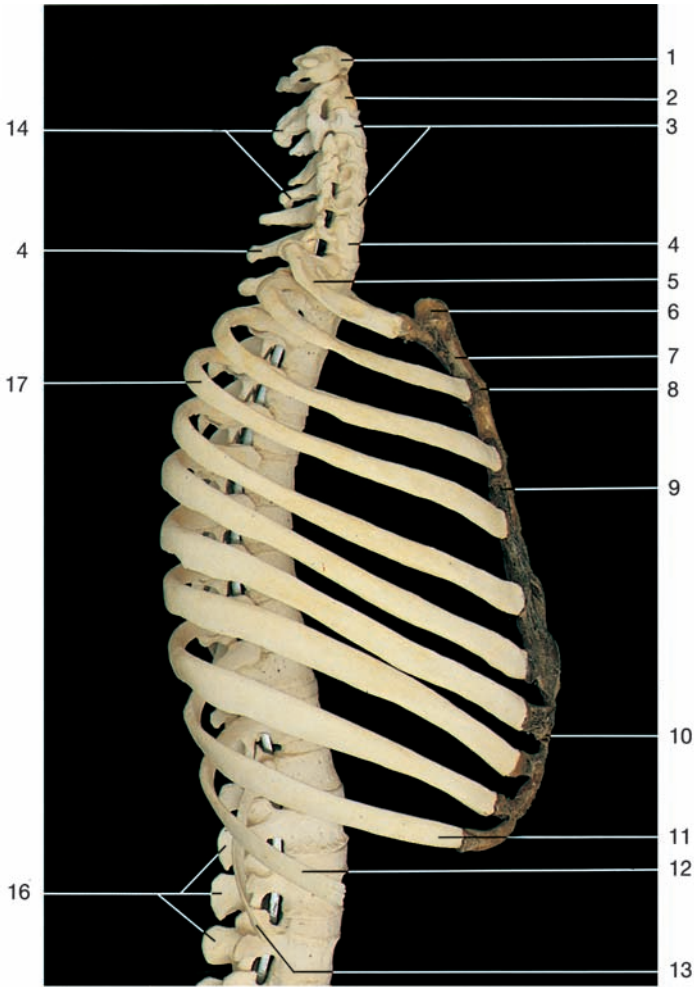
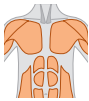
Skeleton of the thorax (posterior aspect).

- 1 Atlas
- 2 Axis
- 3 Cervical vertebrae
- 4 First thoracic vertebra
- 5 First rib
- 6 Facet for clavicle and clavicular notch
- 7 Manubrium sterni
- 8 Sternal angle
- 9 Body of sternum
- 10 Xiphoid process
- 11 Twelfth thoracic vertebra and rib
- 12 Jugular notch
- 13 Second rib
- 14 Costal cartilages
- 15 Infrasternal angle
- 16 Costal arch
- 17 Costotransverse joints between the transverse processes of thoracic vertebrae and the tubercles of the ribs
- 18 Spinous processes
- 19 Costal angle
- 20 Costal processes of lumbar vertebrae



Disarticulated skeleton of the thorax. The twelve ribs (I–XII) are arranged in a craniocaudal direction.

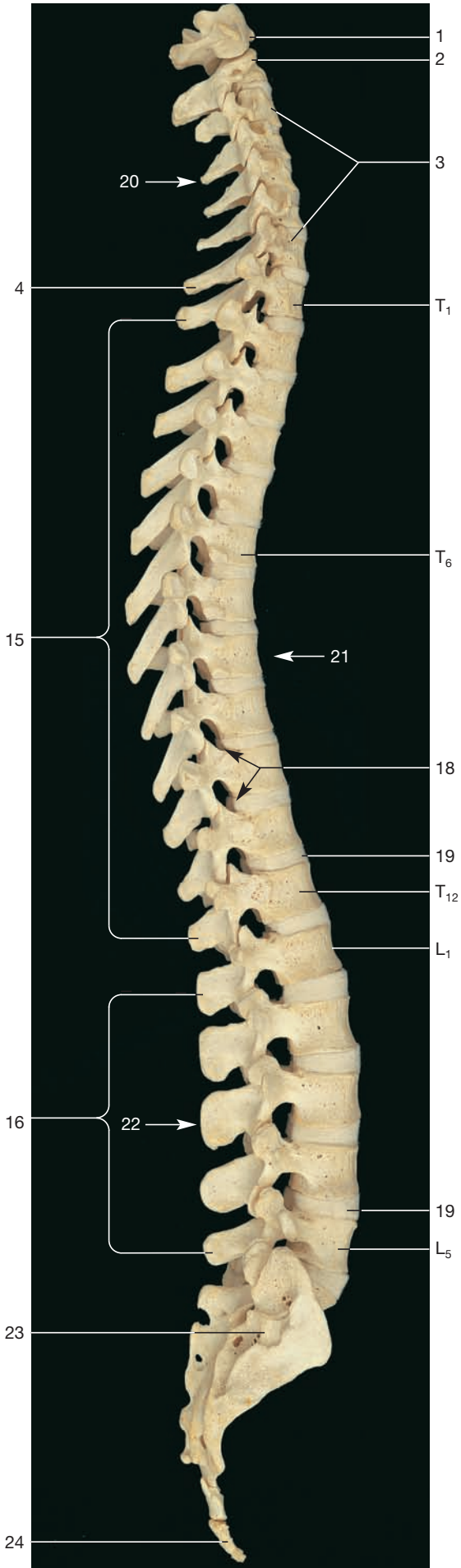


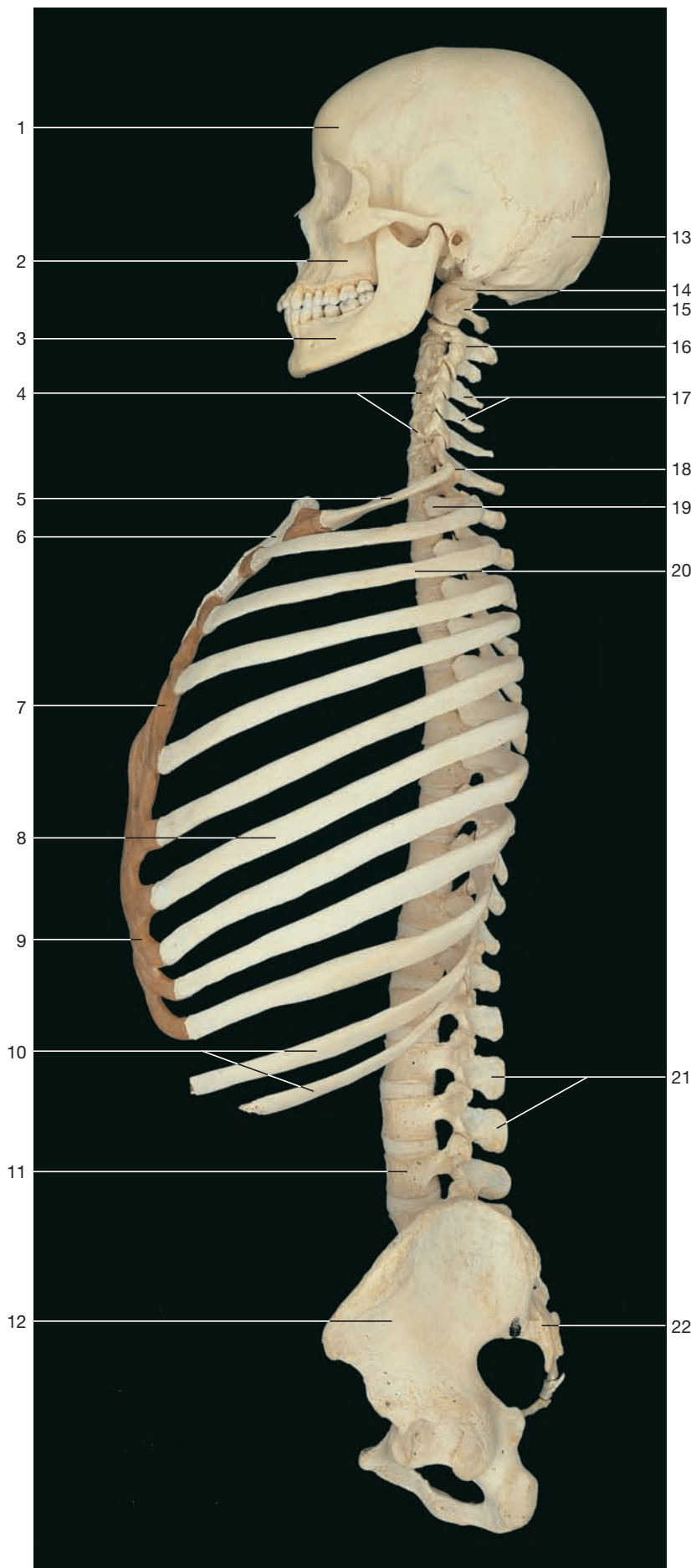


Skeleton of the thorax (right lateral aspect).

- 1 Atlas
- 2 Axis
- 3 Cervical vertebrae
- 4 Vertebra prominens (C₇)
- 5 First rib
- 6 Facet for clavicle
- 7 Manubrium sterni
- 8 Sternal angle
- 9 Body of sternum
- 10 Costal arch
- 11 Tenth rib
- 12 Eleventh rib
- 13 Twelfth rib
- 14 Spinous processes of cervical vertebrae
- 15 Spinous processes of thoracic vertebrae
- 16 Spinous processes of lumbar vertebrae
- 17 Costal angle
- 18 Intervertebral foramina
- 19 Intervertebral discs
- 20 Cervical curvature
- 21 Thoracic curvature
- 22 Lumbar curvature
- 23 Sacrum
- 24 Coccyx

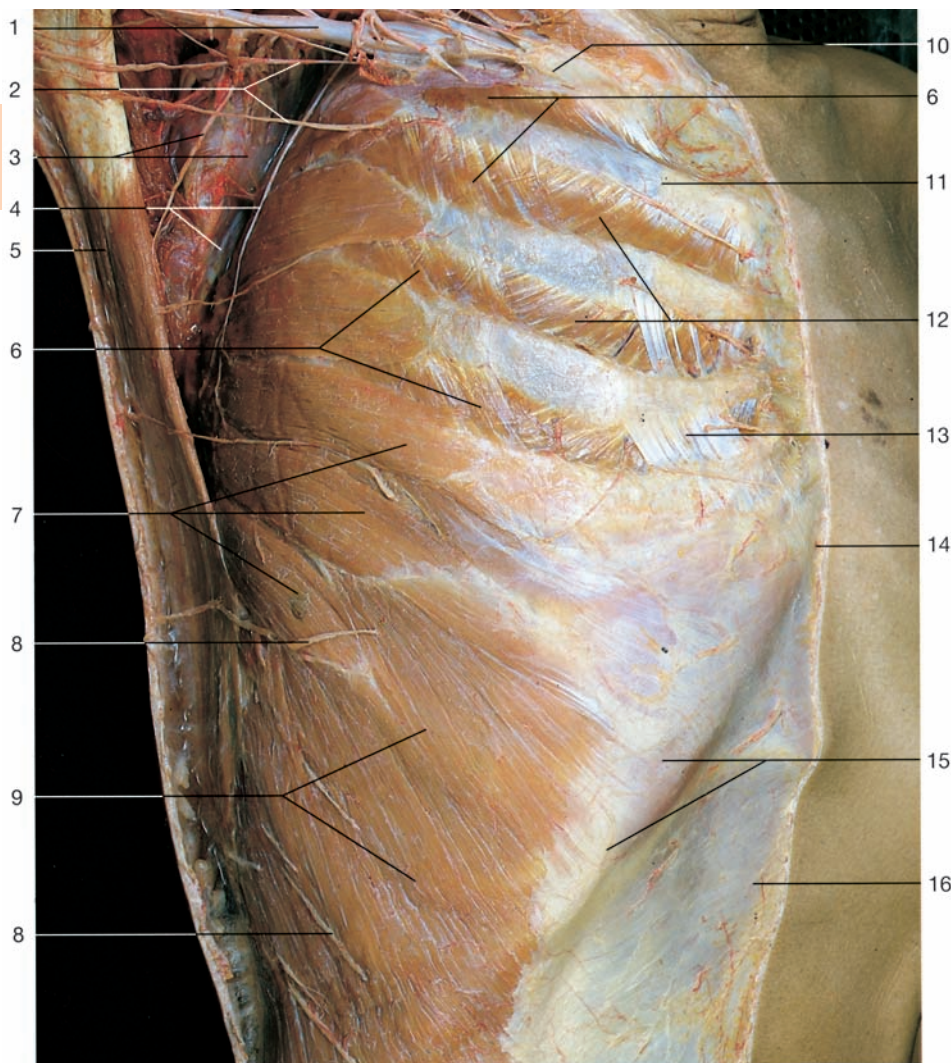
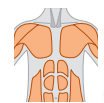
Vertebral column
(right lateral aspect).





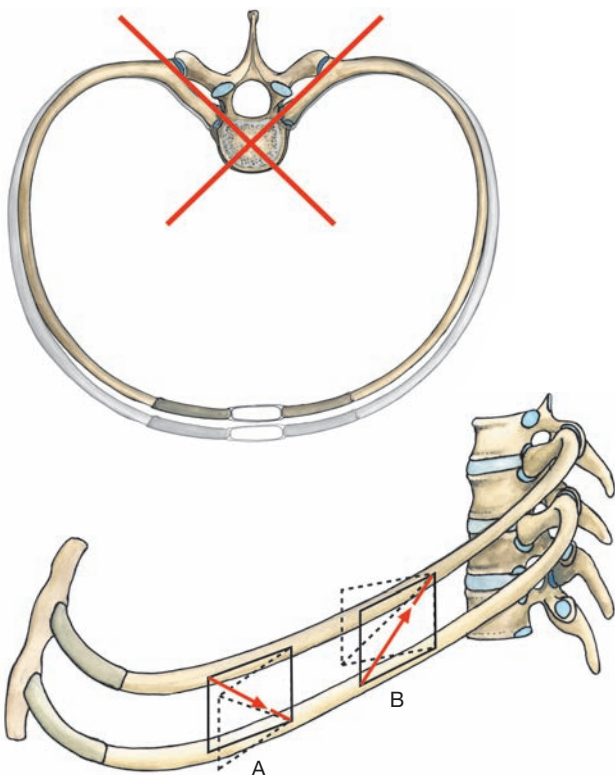
- 1 Frontal bone
- 2 Maxilla
- 3 Mandible
- 4 Bodies of cervical vertebrae
- 5 First rib
- 6 Manubrium of sternum
- 7 Sternum (corpus sterni)
- 8 Seventh rib (last of the true ribs)
- 9 Costal arch
- 10 Floating ribs (costae fluctuantes)
- 11 Body of fourth lumbar vertebra
- 12 Pelvis
- 13 Occipital bone
- 14 Atlanto-occipital joint
- 15 Atlas
- 16 Axis
- 17 Spinous processes of cervical vertebrae (C_4 , C_5)
- 18 Costotransverse joint of first rib
- 19 Head of second rib
- 20 Third rib
- 21 Spinous processes of lumbar vertebrae (L_2 , L_3)
- 22 Sacrum

Vertebral column and thorax in connection with head and pelvis (lateral aspect).

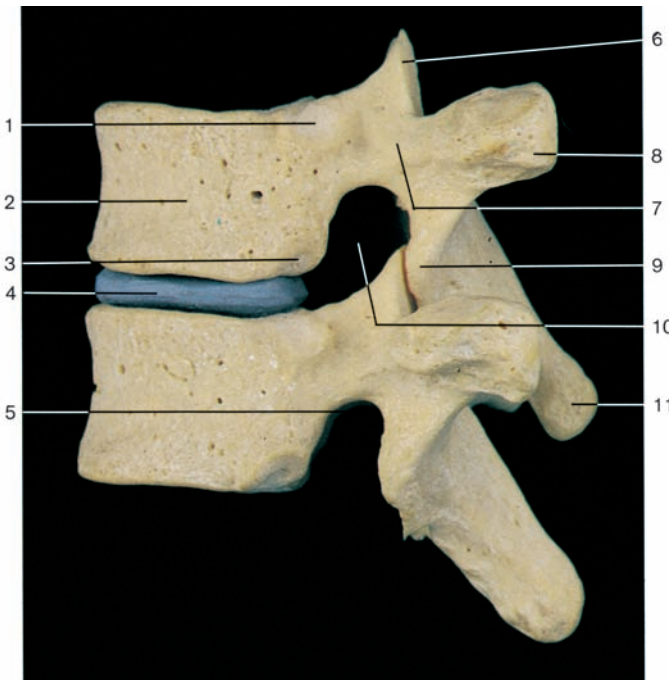


- 1 Axillary vein
- 2 Intercostobrachial nerves
- 3 Subscapularis muscle and thoracodorsal nerve
- 4 Long thoracic nerve, lateral thoracic artery and vein
- 5 Latissimus dorsi muscle
- 6 External intercostal muscles
- 7 Serratus anterior muscle
- 8 Lateral cutaneous branches of intercostal nerves
- 9 External abdominal oblique muscle
- 10 Clavicle (divided)
- 11 Second rib (costochondral junction)
- 12 Internal intercostal muscles
- 13 External intercostal membrane
- 14 Position of xiphoid process
- 15 Costal arch or margin
- 16 Anterior layer of rectus sheath

Muscles of the thorax, superficial layer (lateral aspect). Upper limb elevated. Pectoralis major and minor muscles have been removed.

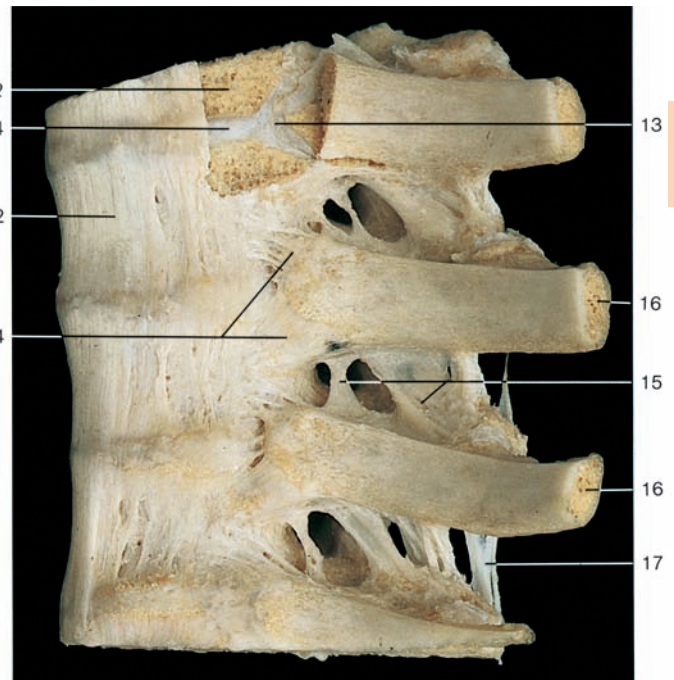


Effect of intercostal muscles on the costovertebral and costotransverse joints. Axes of movement indicated by red lines; direction of movements indicated by red arrows.
A = Action of internal intercostal muscles (expiration);
B = Action of external intercostal muscles (inspiration).



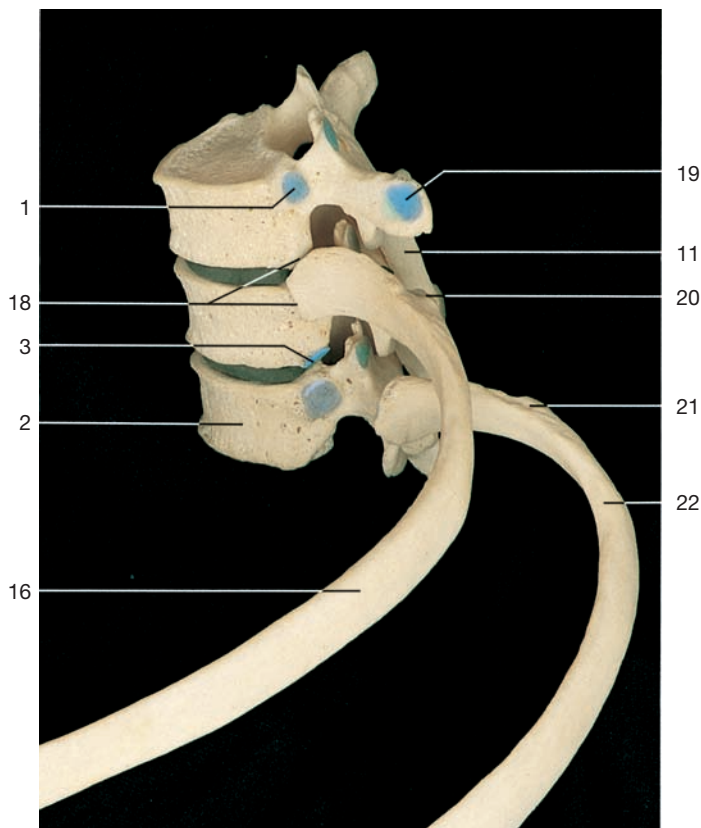
Two thoracic vertebrae (left lateral aspect).

- | | |
|---|--------------------------------------|
| 1 Superior demifacet for head of rib | 9 Inferior articular process |
| 2 Body of vertebra | 10 Intervertebral foramen |
| 3 Inferior demifacet for head of rib | 11 Spinous process |
| 4 Intervertebral disc | 12 Anterior longitudinal ligament |
| 5 Inferior vertebral notch | 13 Intra-articular ligament |
| 6 Superior articular facet and superior articular process | 14 Radiate ligament |
| 7 Pedicle | 15 Superior costotransverse ligament |
| 8 Transverse process and facet for tubercle of rib | 16 Body of rib |

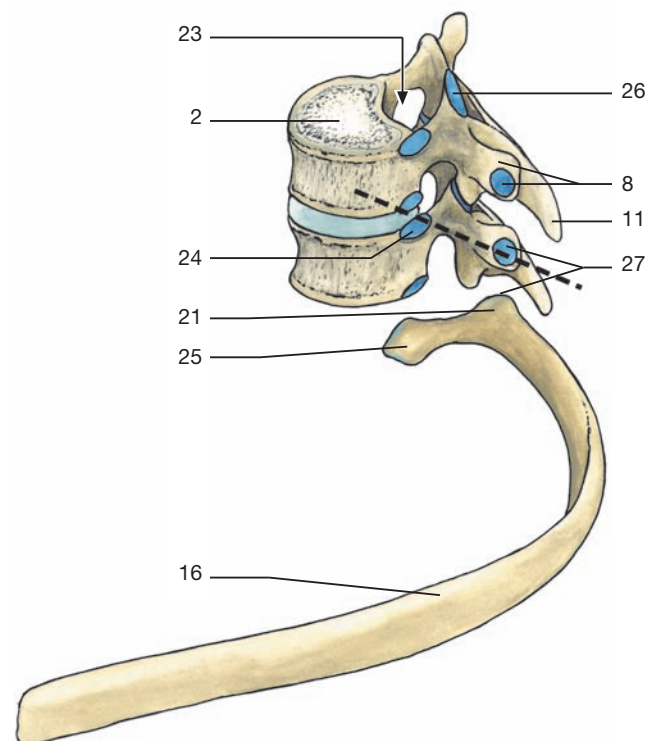


Ligaments of thoracic vertebrae and costovertebral joints (left antero-lateral aspect).

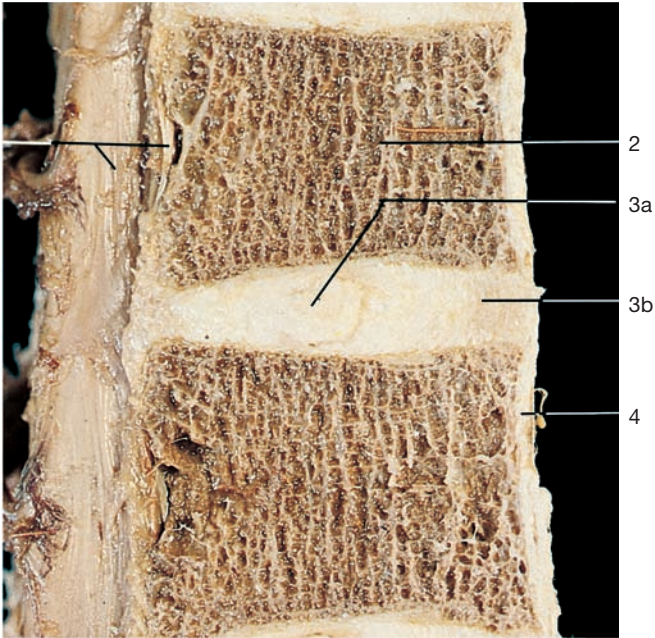
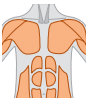
- | | |
|---|--|
| 17 Intertransverse ligament | 23 Vertebral canal |
| 18 Articulation of head of rib with two vertebrae | 24 Inferior facet of articulation with head of rib |
| 19 Angle of costotransverse joint (articular facet) | 25 Head of rib |
| 20 Costotransverse joint | 26 Superior articular process |
| 21 Tubercle of rib | 27 Facets of articulation with costotransverse joint |
| 22 Costal angle of rib | |



Costovertebral joints (lateral aspect).

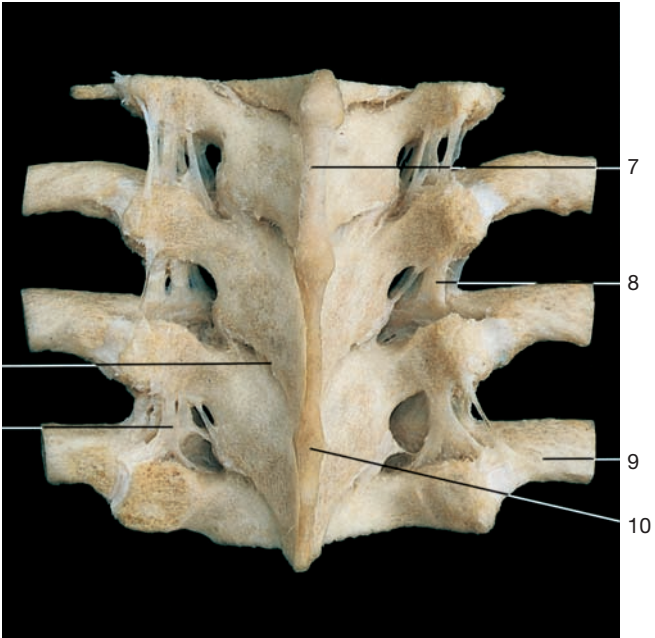


Costovertebral joints (lateral aspect). Two thoracic vertebrae with an articulating rib (separated). Axis of movement indicated by dashed line. Blue = articular facets.



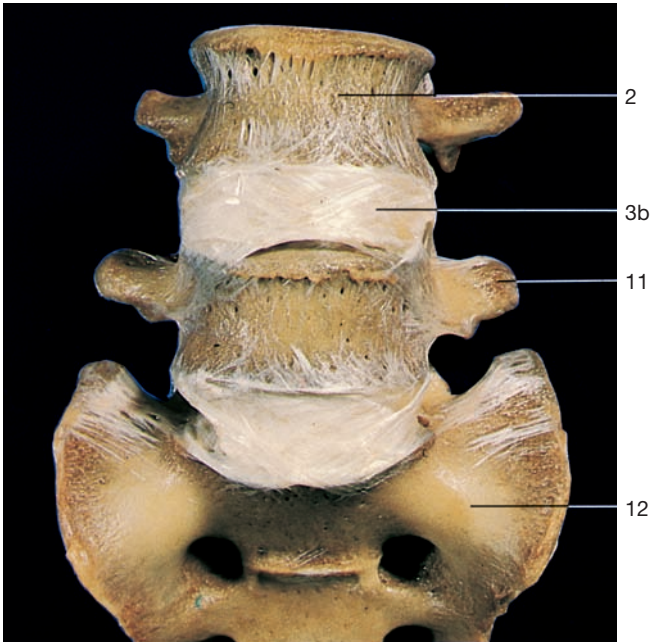
Medial sagittal section through the bodies of lumbar vertebrae, showing the intervertebral discs, each of which consists of an outer laminated portion and an inner core.

- 1 Posterior longitudinal ligament and spinal dura mater
- 2 Body of vertebra
- 3 Intervertebral disc
 - a Inner core (nucleus pulposus)
 - b Outer portion (anulus fibrosus)
- 4 Anterior longitudinal ligament
- 5 Ligamentum flavum
- 6 Intertransverse ligament
- 7 Supraspinous ligament

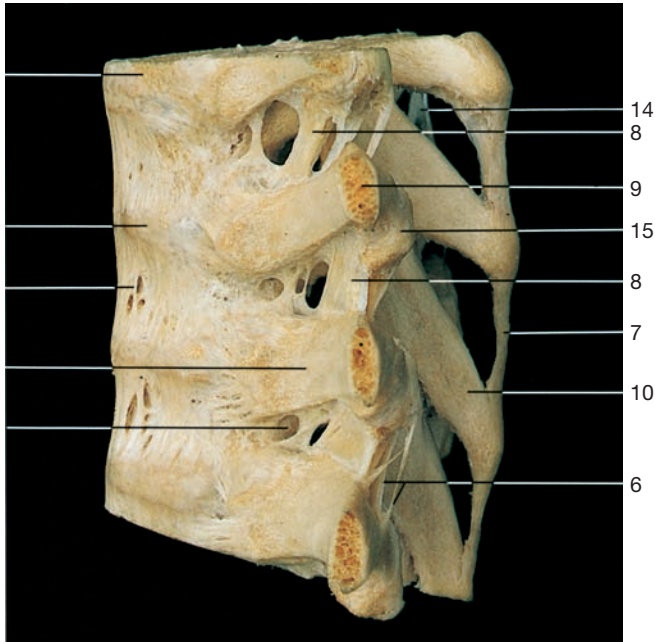


Ligaments of the thoracic vertebrae (posterior aspect).

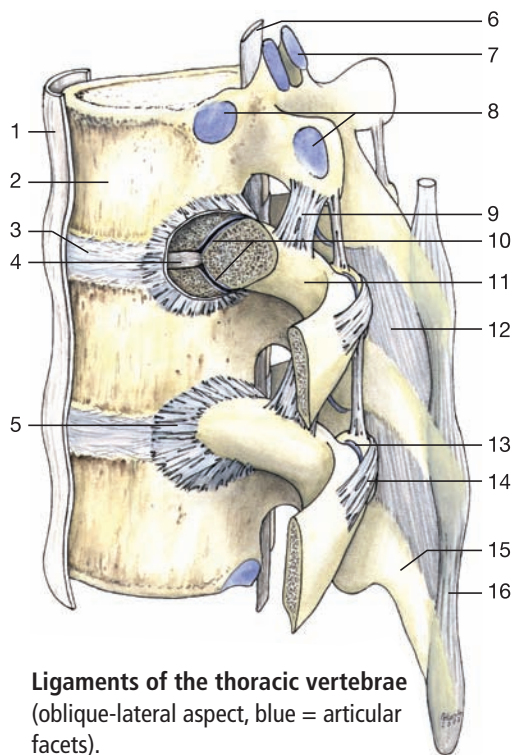
- 8 Superior costotransverse ligament
- 9 Rib
- 10 Spinous process
- 11 Costal process of lumbar vertebra
- 12 Sacrum
- 13 Intervertebral foramen
- 14 Interspinous ligament
- 15 Transverse process of thoracic vertebra



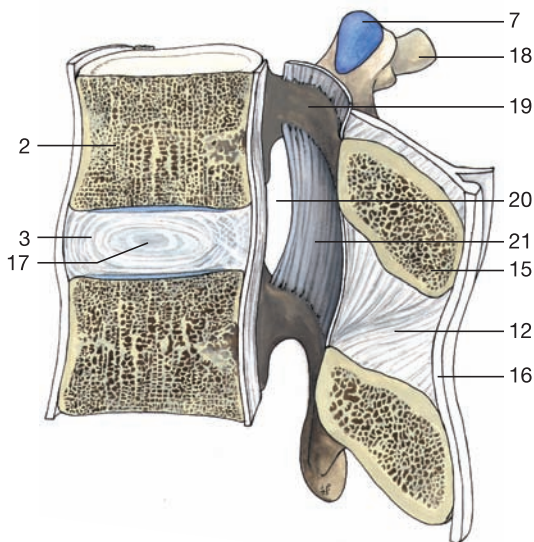
Two caudal lumbar vertebrae and sacrum with their intervertebral discs (anterior aspect). Anterior longitudinal ligament removed.



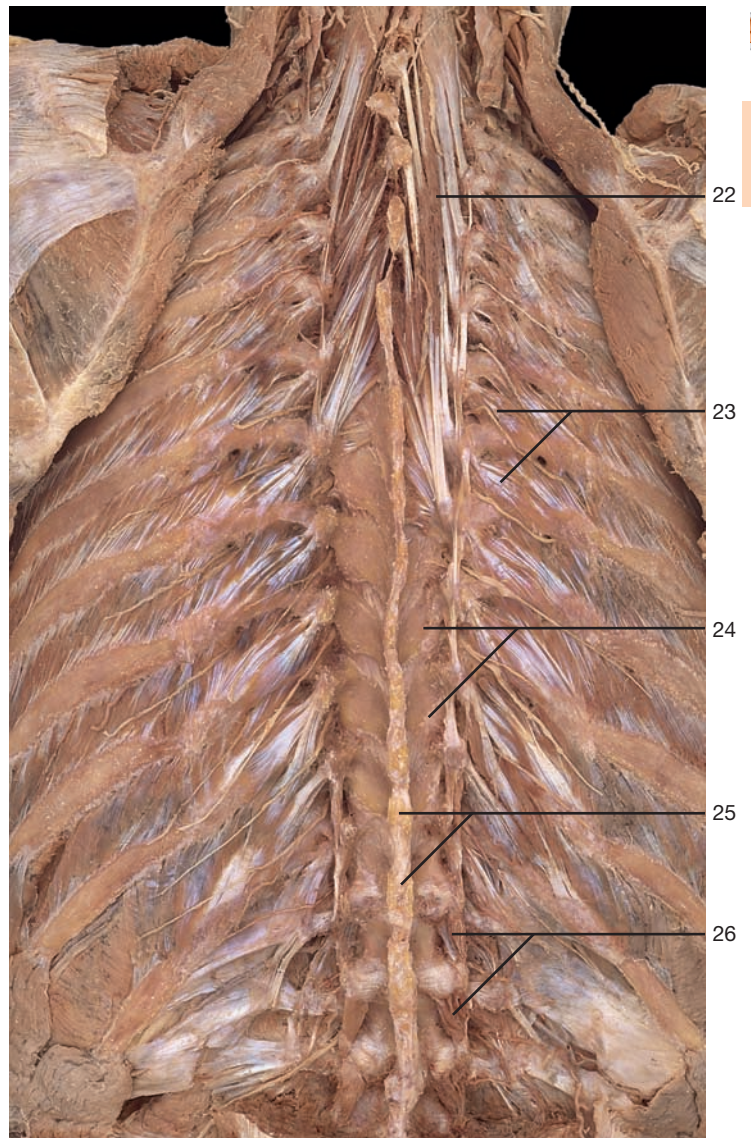
Ligaments of the thoracic vertebrae (left lateral aspect).



Ligaments of the thoracic vertebrae
(oblique-lateral aspect, blue = articular facets).

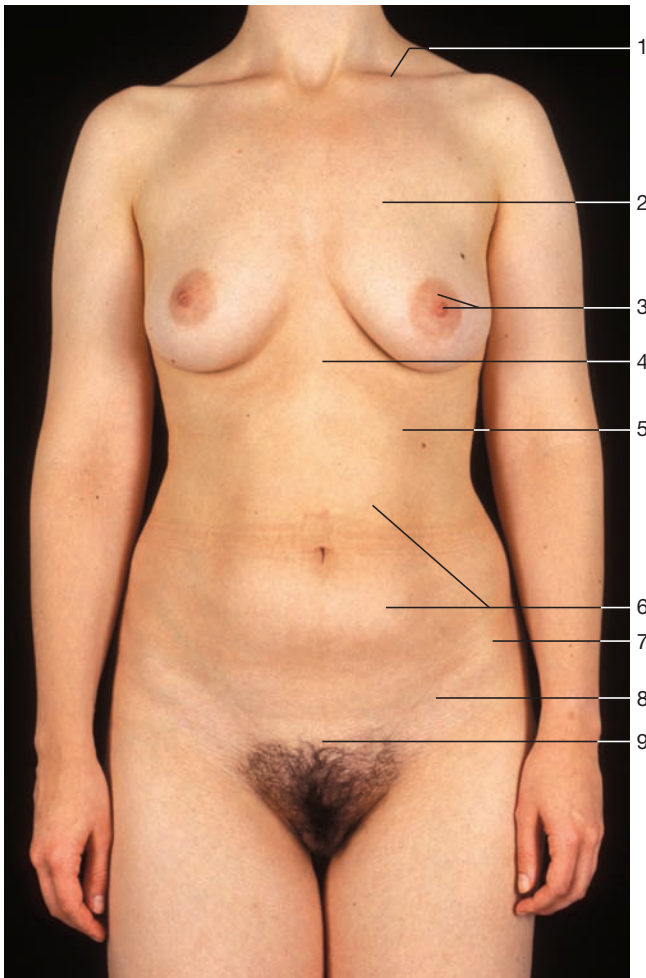
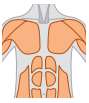


Ligaments of the lumbar vertebrae
(median sagittal section, blue = articular facets).



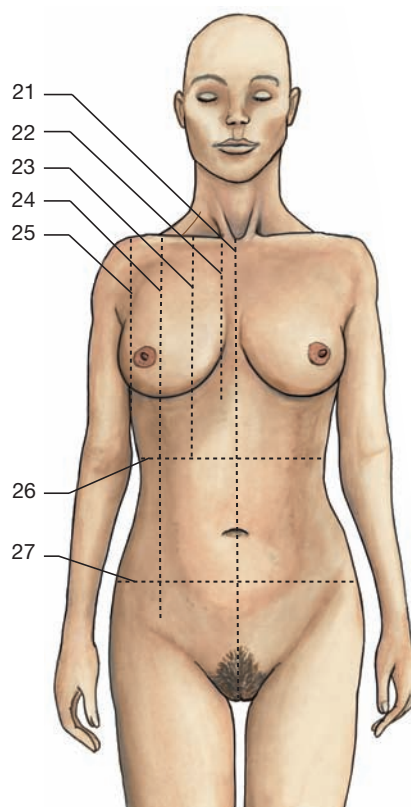
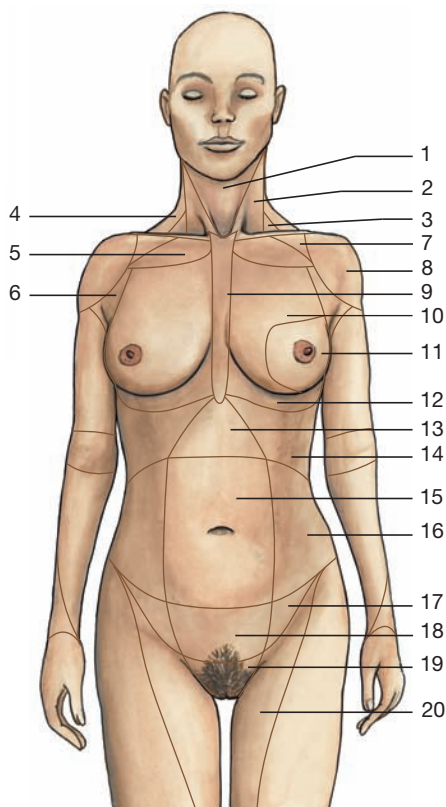
Vertebral column and ribs (posterior aspect). Muscles of the back has been widely removed to display the ligaments.

- | | | |
|--|-------------------------------------|--|
| 1 Anterior longitudinal ligament | 10 Joint of head of rib | 20 Intervertebral foramen |
| 2 Body of vertebra | 11 Rib | 21 Intertransverse ligament |
| 3 Intervertebral disc | 12 Interspinal ligament | 22 Semispinalis cervicis muscle |
| 4 Intra-articular ligament | 13 Costotransverse joint | 23 Levatores costarum muscles |
| 5 Radiate ligament | 14 Lateral costotransverse ligament | 24 Bodies of lumbar vertebrae |
| 6 Posterior longitudinal ligament | 15 Spinous process | 25 Spinous processes of lumbar vertebrae and supraspinal ligaments |
| 7 Superior articular facet | 16 Supraspinal ligament | 26 Intertransversarii muscles |
| 8 Articular facets of joint of head of rib and costotransverse joint | 17 Nucleus pulposus | |
| 9 Superior costotransverse ligament | 18 Costal process | |
| | 19 Vertebral arch | |



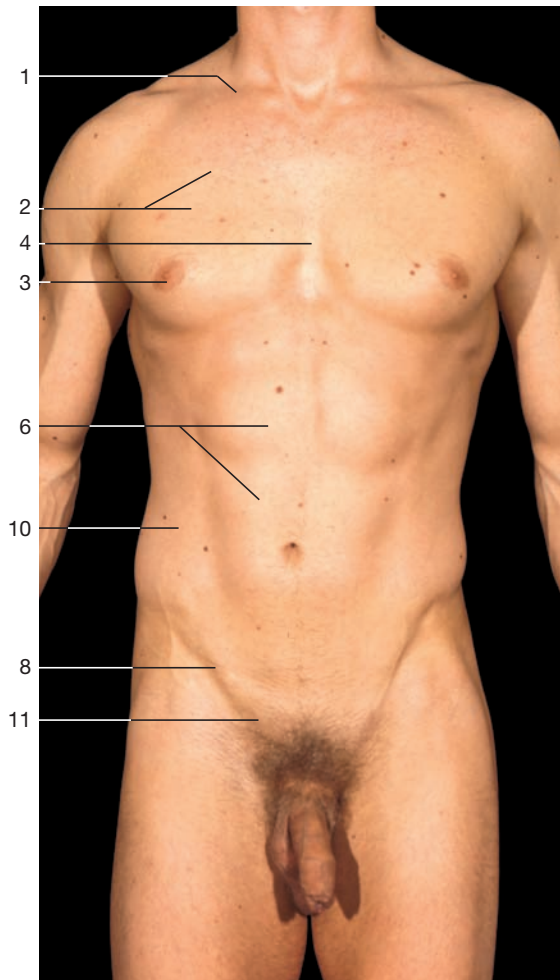
- 1 Clavicle
- 2 Pectoralis major muscle
- 3 Areola and nipple
- 4 Infrasternal angle
- 5 Costal arch
- 6 Rectus abdominis muscle
- 7 Anterior superior iliac spine
- 8 Inguinal ligament
- 9 Mons pubis
- 10 External abdominal oblique muscle
- 11 Spermatic cord
- 12 Deltoid muscle
- 13 External intercostal muscle
- 14 Internal abdominal oblique muscle
- 15 Transverse abdominal muscle
- 16 Rectus sheath
- 17 Pectoralis minor muscle
- 18 Anterior serratus muscle
- 19 Linea alba

Surface anatomy of the anterior body wall in the female.
Note the differences of hairiness between the regions.

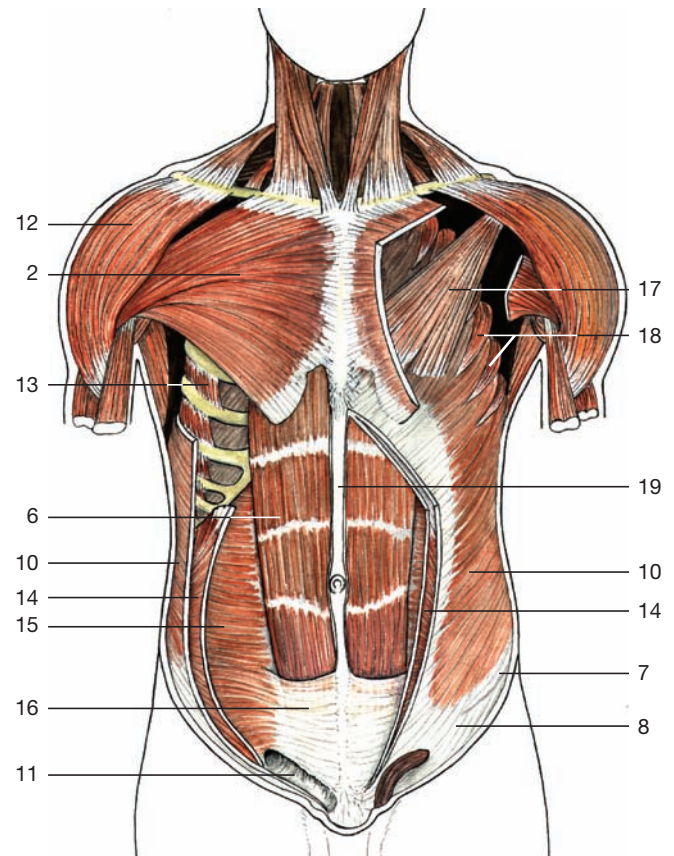


- 1 Anterior cervical region
- 2 Sternocleidomastoid region
- 3 Omoclavicular triangle
- 4 Lateral cervical region
- 5 Infraclavicular fossa
- 6 Axillary region
- 7 Clavipectoral triangle
- 8 Deltoid region
- 9 Presternal region
- 10 Inframammary region
- 11 Mammary region
- 12 Pectoral region
- 13 Epigastric region
- 14 Hypochondriac region
- 15 Umbilical region
- 16 Lateral abdominal region
- 17 Inguinal region
- 18 Pubic region
- 19 Urogenital region
- 20 Femoral triangle
- 21 Anterior median line
- 22 Sternal line
- 23 Parasternal line
- 24 Mammillary line (medioclavicular line)
- 25 Axillary line
- 26 Horizontal plane at the level of the inferior thoracic aperture
- 27 Horizontal plane at the level of the anterior superior iliac spine

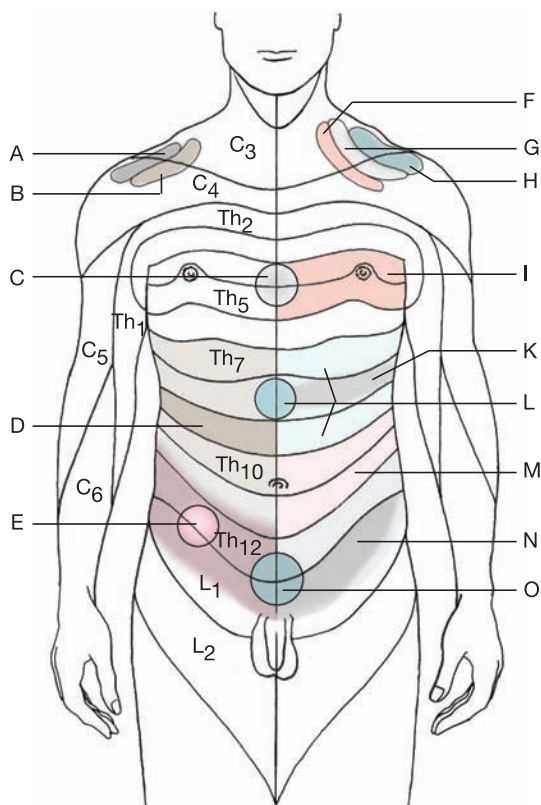
Regions and regional lines of the anterior body wall in the female.



Surface anatomy of the anterior body wall in the male. Localization and structure of the muscles can be identified.



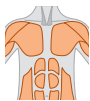
Muscles of the anterior body wall.



Head's zones

- A = Duodenum
- B = Gallbladder, liver (C₃–C₄)
- C = Esophagus (Th₄, Th₅)
- D = Liver, gallbladder (Th₆–Th₁₁)
- E = Colon, vermiform appendix (Th₁₁–T₁₂, L₁)
- F = Heart
- G = Pancreas
- H = Stomach (C₃, C₄)
- I = Heart (Th₃, Th₄)
- K = Pancreas (Th₈)
- L = Stomach (Th₆–Th₉)
- M = Small intestine (Th₁₀–L₁)
- N = Kidney, ureter, testis (Th₁₀–L₁)
- O = Urinary bladder (Th₁₁–L₁)

◁ Segments of the anterior body wall.
Head's zones are indicated.



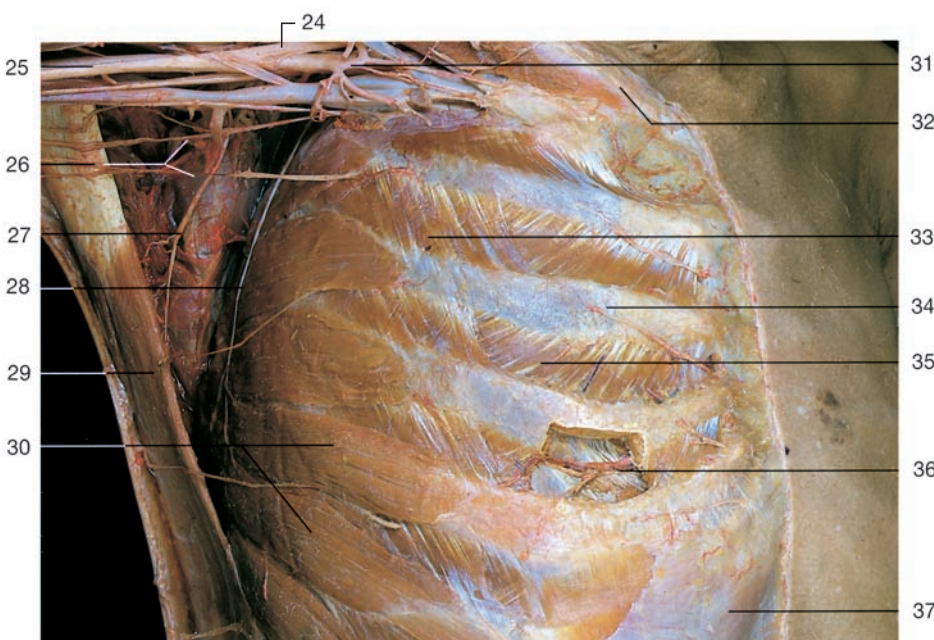
Anterior thoracic wall (posterior aspect). Diaphragm partly removed, posterior layer of rectus sheath fenestrated on both sides.

- | | |
|--|--|
| 1 Sternocleidomastoid muscle (divided) | 11 Subclavian artery and brachial plexus |
| 2 Clavicle | 12 First rib |
| 3 Sternothyroid muscle | 13 Internal thoracic artery and vein |
| 4 Internal intercostal muscle | 14 Sternum |
| 5 Transversus thoracis muscle | 15 Innermost intercostal muscle |
| 6 Intercostal arteries and nerves | 16 Intercostal artery and vein |
| 7 Musculophrenic artery | 17 Xiphoid process |
| 8 Superior epigastric artery and vein | 18 Linea alba and |
| 9 Diaphragm (divided) | posterior layer of rectus sheath |
| 10 Rectus abdominis muscle | 19 Transverse abdominal muscle |

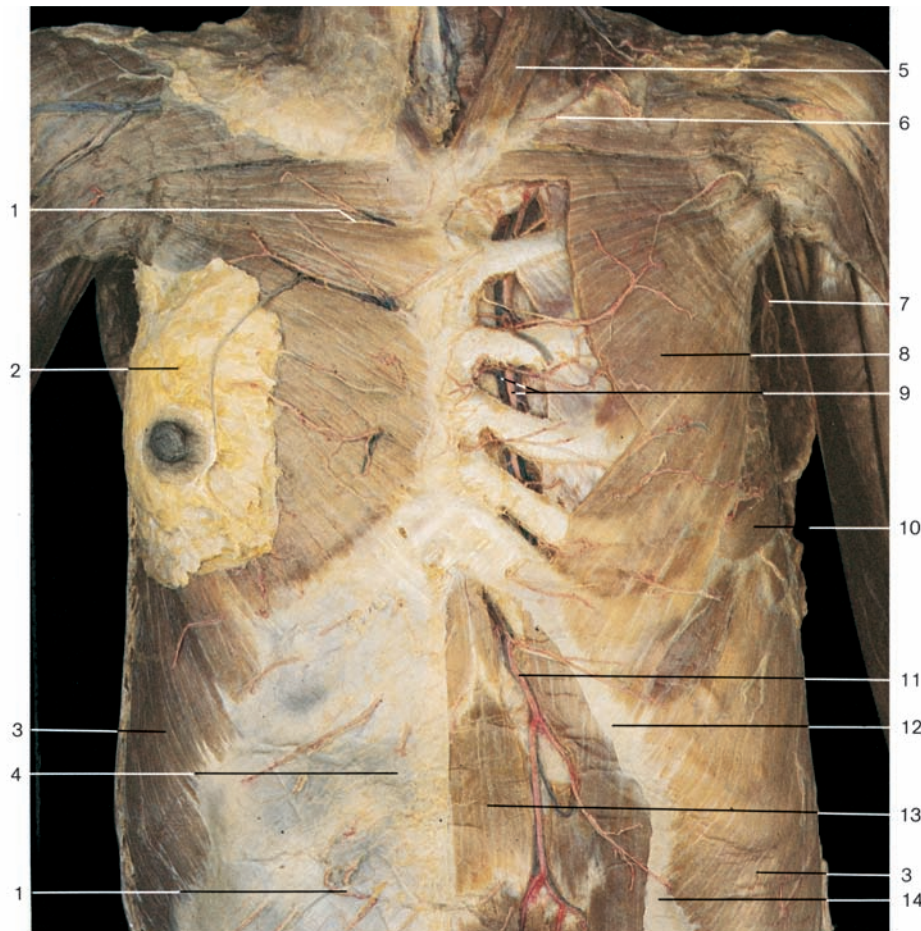
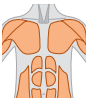


Thoracic wall (anterior aspect). Left pectoralis major muscle has been divided and reflected. Note the connection of the cephalic vein with the subclavian vein. Arrow: medial pectoral nerve.

- 1 Mandible
- 2 Facial artery
- 3 Submandibular gland
- 4 Hyoid bone
- 5 Thyroid cartilage and sternohyoid muscle
- 6 Clavicle
- 7 Subclavius muscle
- 8 Second rib
- 9 Anterior cutaneous branches of intercostal nerves
- 10 External intercostal membrane
- 11 Parotid gland
- 12 External carotid artery
- 13 Sternocleidomastoid muscle and cutaneous branches of cervical plexus
- 14 Supraclavicular nerves
- 15 Pectoralis major muscle and lateral pectoral nerves
- 16 Thoraco-acromial artery and subclavian vein
- 17 Pectoralis minor muscle
- 18 Median and ulnar nerve
- 19 Thoraco-epigastric vein
- 20 Cephalic vein and long head of biceps brachii muscle
- 21 Lateral thoracic artery and long thoracic nerve
- 22 Lateral cutaneous branches of intercostal nerve
- 23 Latissimus dorsi muscle
- 24 Median nerve
- 25 Axillary artery
- 26 Intercostobrachial nerves
- 27 Thoracodorsal nerve
- 28 Long thoracic nerve
- 29 Latissimus dorsi muscle
- 30 Serratus anterior muscle
- 31 Thoraco-acromial artery
- 32 Clavicle
- 33 External intercostal muscle
- 34 Third rib
- 35 Internal intercostal muscle
- 36 Anterior intercostal artery and vein, and intercostal nerve
- 37 Costal arch or margin

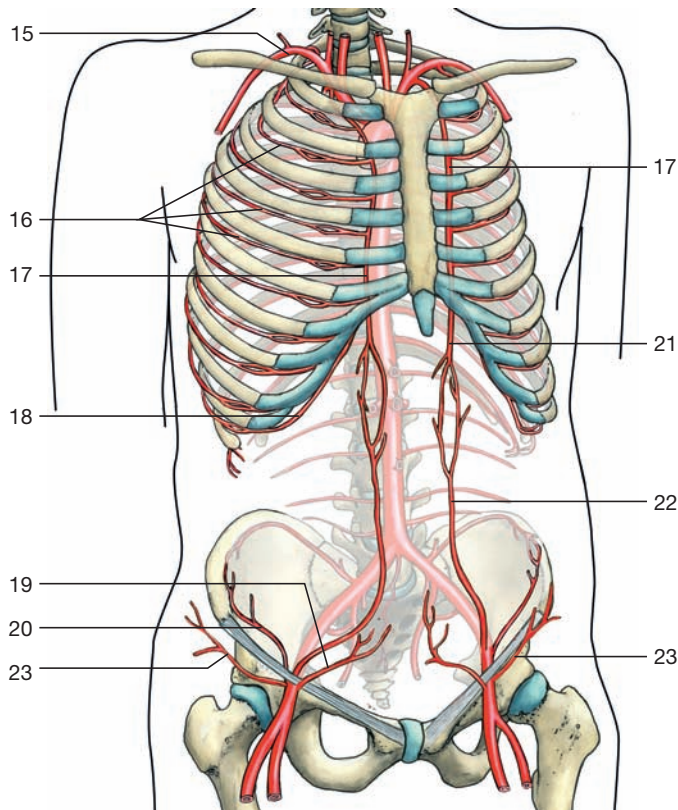


Thoracic wall (lateral aspect). Pectoralis major and minor muscles have been removed. A section of the fourth rib has been cut and removed to display the intercostal vessels and nerve.



- 1 Anterior perforating branches of intercostal nerve
- 2 Mammary gland
- 3 External abdominal oblique muscle
- 4 Rectus sheath (anterior layer)
- 5 Sternocleidomastoid muscle
- 6 Clavicle
- 7 Lateral thoracic artery and vein
- 8 Pectoralis major muscle
- 9 Internal thoracic artery and vein
- 10 Serratus anterior muscle
- 11 Superior epigastric artery and vein
- 12 Costal margin
- 13 Rectus abdominis muscle
- 14 Cut edge of the anterior layer of the rectus sheath
- 15 Subclavian artery
- 16 Highest intercostal artery
- 17 Internal thoracic artery
- 18 Musculophrenic artery
- 19 Superficial epigastric artery
- 20 Deep circumflex iliac artery
- 21 Superior epigastric artery
- 22 Inferior epigastric artery
- 23 Superficial circumflex iliac artery

Thoracic and abdominal walls (anterior aspect). Dissection of the internal thoracic artery and vein. Left pectoralis major muscle partly removed. Anterior lamina of the rectus sheath on the left side has been removed.

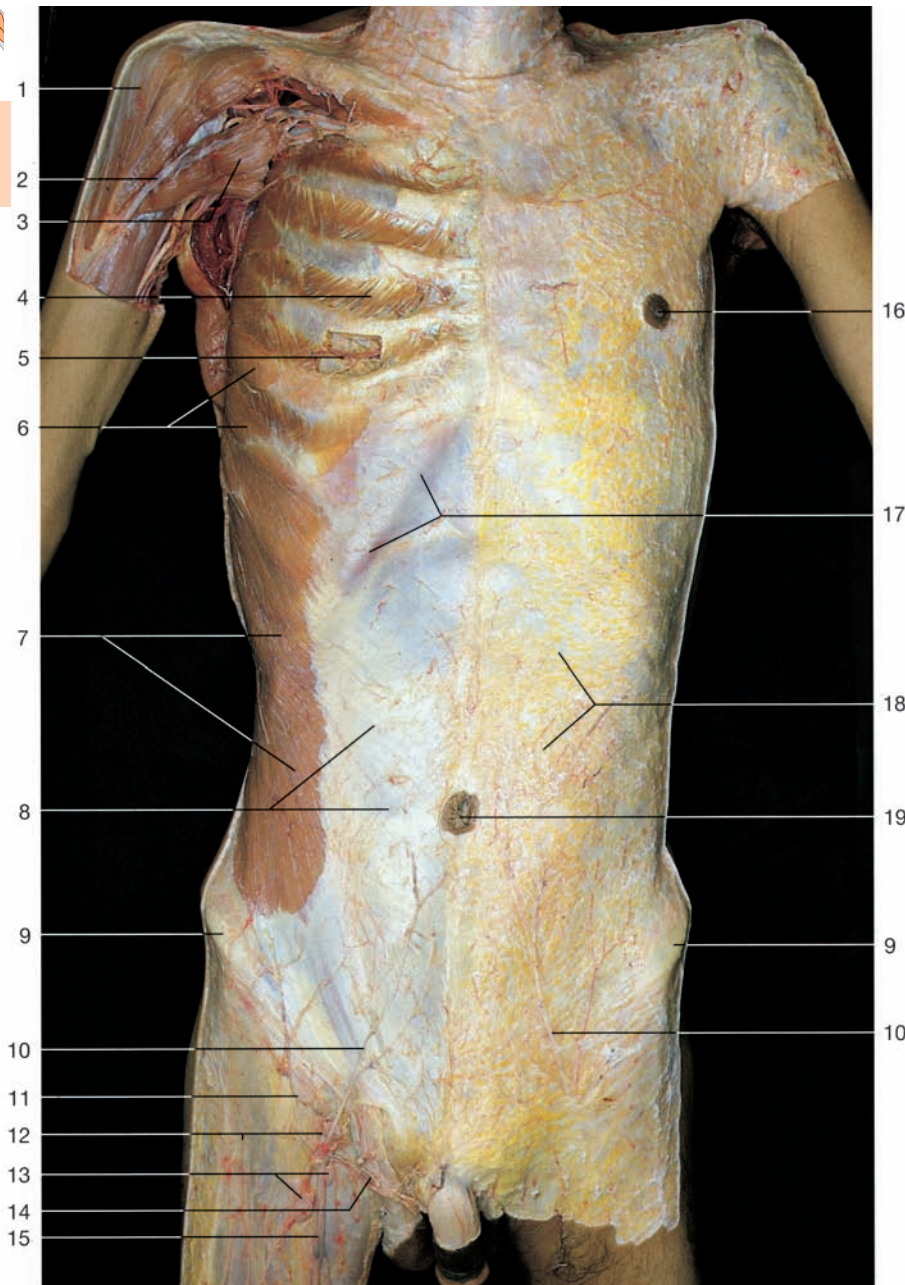
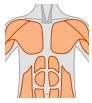


Main arteries of thoracic and abdominal walls (anterior aspect).



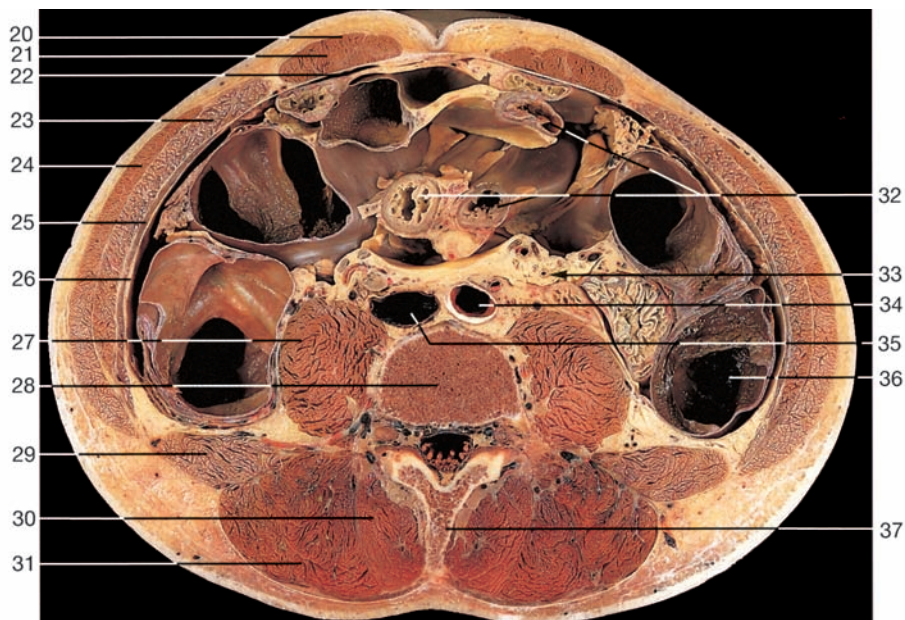
Thoracic and abdominal walls with superficial muscles (anterior aspect). The fascia of pectoralis major muscle and the abdominal wall have been removed; the anterior layer of the sheath of the rectus abdominis muscle is displayed.

- | | |
|--|---|
| 1 Sternohyoid muscle | 9 Umbilicus and umbilical ring |
| 2 Sternocleidomastoid muscle | 10 Clavicle |
| 3 Supraclavicular nerves (branches of cervical plexus) | 11 Cephalic vein |
| 4 Deltoid muscle | 12 Serratus anterior muscle |
| 5 Pectoralis major muscle | 13 Linea alba |
| 6 Anterior cutaneous branches of intercostal nerves | 14 Sheath of rectus abdominis muscle (anterior layer) |
| 7 External abdominal oblique muscle | 15 Inguinal ligament |
| 8 Lateral cutaneous branches of intercostal nerves | |

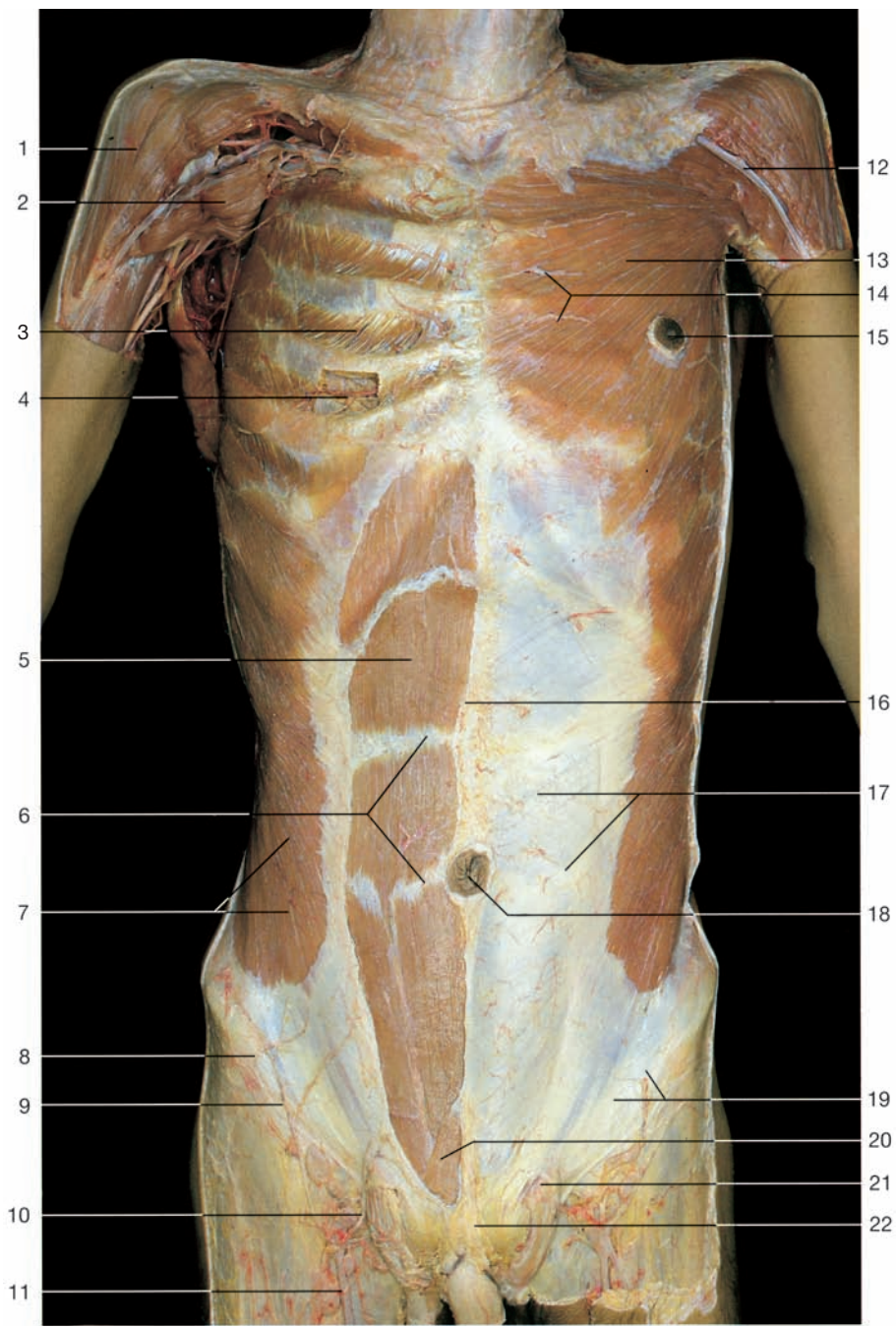


- 1 Deltoid muscle
- 2 Cephalic vein
- 3 Pectoralis major muscle (divided)
- 4 Internal intercostal muscle
- 5 Intercostal artery and vein (intercostal space, fenestrated)
- 6 Serratus anterior muscle
- 7 External abdominal oblique muscle
- 8 Anterior layer of rectus sheath
- 9 Iliac crest
- 10 Superficial epigastric vein
- 11 Superficial circumflex iliac vein
- 12 Saphenous opening
- 13 Superficial inguinal lymph nodes
- 14 Superficial external pudendal veins
- 15 Great saphenous vein
- 16 Nipple
- 17 Costal margin
- 18 Subcutaneous fatty tissue
- 19 Umbilicus
- 20 Anterior layer of rectus sheath
- 21 Rectus abdominis muscle
- 22 Posterior layer of rectus sheath
- 23 Internal abdominal oblique muscle
- 24 External abdominal oblique muscle (cut)
- 25 Transverse abdominal muscle
- 26 Transversalis fascia and peritoneum
- 27 Psoas major muscle
- 28 Body of lumbar vertebra (L₄)
- 29 Quadratus lumborum muscle
- 30 Medial tract of erector spinae muscle
- 31 Lateral tract of erector spinae muscle (longissimus and iliocostalis muscles)
- 32 Small intestine
- 33 Left ureter
- 34 Abdominal aorta
- 35 Inferior vena cava
- 36 Descending colon
- 37 Spinous process

Thoracic and abdominal walls (anterior aspect). Right pectoralis major and minor muscles are divided. Muscles of thoracic and abdominal walls on the right side are displayed.

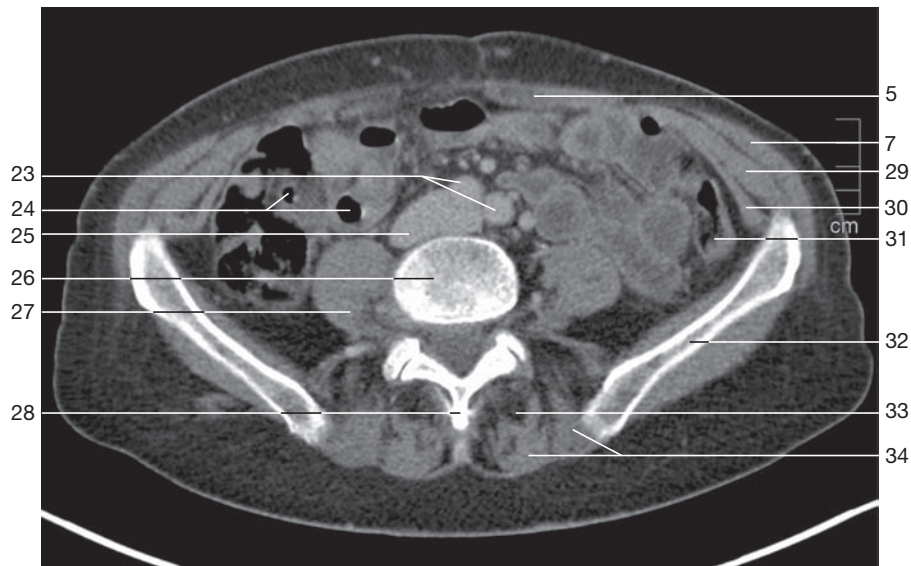


Horizontal section through the trunk at the level of the umbilicus, superior to arcuate line (inferior aspect).

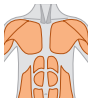


- 1 Deltoid muscle
- 2 Pectoralis major muscle (divided)
- 3 Internal intercostal muscle
- 4 Intercostal artery and vein
- 5 Rectus abdominis muscle
- 6 Tendinous intersections
- 7 External abdominal oblique muscle
- 8 Anterior superior iliac spine
- 9 Superficial circumflex iliac vein
- 10 Superficial epigastric vein
- 11 Great saphenous vein
- 12 Cephalic vein
- 13 Pectoralis major muscle
- 14 Anterior cutaneous branches of intercostal nerves
- 15 Nipple
- 16 Linea alba
- 17 Anterior layer of rectus sheath
- 18 Umbilicus
- 19 Inguinal ligament
- 20 Pyramidal muscle
- 21 Superficial inguinal ring and spermatic cord
- 22 Fundiform ligament of penis
- 23 Common iliac arteries
- 24 Small intestine
- 25 Inferior vena cava
- 26 Body of lumbar vertebra (L₄)
- 27 Psoas major muscle
- 28 Spinous process
- 29 Internal abdominal oblique muscle
- 30 Transverse abdominal muscle
- 31 Descending colon
- 32 Ilium
- 33 Multifidus muscle
- 34 Longissimus and iliocostalis muscles

Thoracic and abdominal walls (anterior aspect). Right pectoralis major and minor muscles and anterior layer of rectus sheath have been removed on the right side.

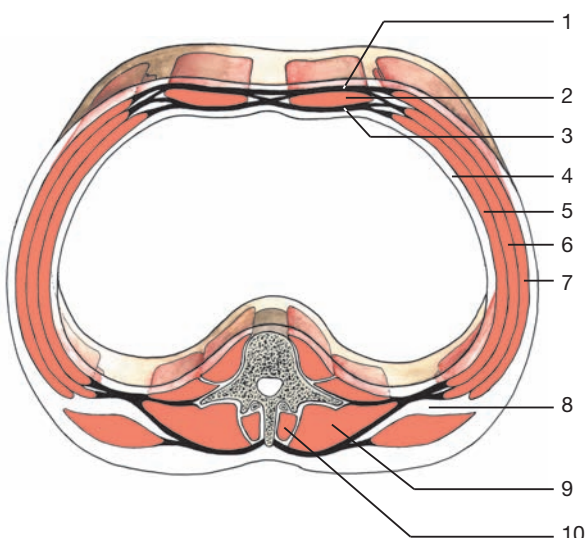


Horizontal section through the trunk at the level of fourth lumbar vertebra (inferior aspect, CT scan).



- 1 Costal margin
- 2 Rectus abdominis muscle
- 3 External abdominal oblique muscle (reflected)
- 4 Thoraco-abdominal (intercostal) nerves with accompanying vessels
- 5 Internal abdominal oblique muscle
- 6 Arcuate line (arrow)
- 7 Inferior epigastric artery and vein
- 8 Ilio-inguinal nerve
- 9 Position of deep inguinal ring
- 10 Superficial inguinal lymph nodes
- 11 Great saphenous vein
- 12 Linea alba
- 13 Iliohypogastric nerve
- 14 Pyramidal muscle
- 15 Spermatic cord
- 16 Fundiform ligament of penis

Thoracic and abdominal walls (anterior aspect). External abdominal oblique muscle has been divided and reflected on both sides. The right rectus muscle has been reflected medially to display the posterior layer of rectus sheath. Arrow: location of arcuate line.



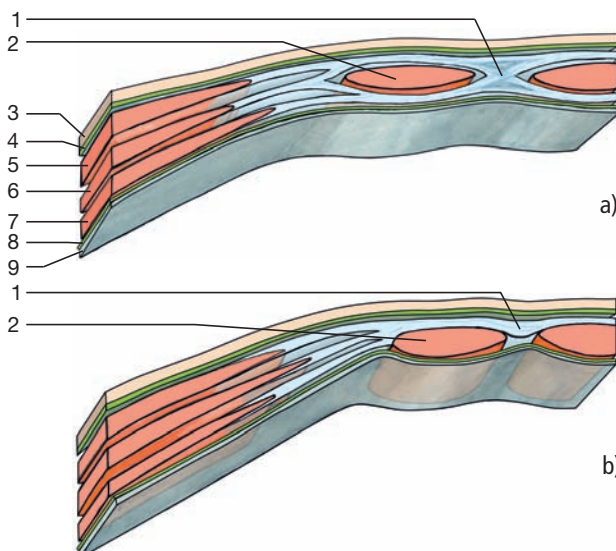
- 1 Anterior layer of rectus sheath
- 2 Rectus abdominis muscle
- 3 Posterior layer of rectus sheath
- 4 Transversalis fascia
- 5 Transverse abdominal muscle
- 6 Internal abdominal oblique muscle
- 7 External abdominal oblique muscle
- 8 Thoracolumbar fascia with superficial and deep layer
- 9 Lateral column of erector spinae muscle
- 10 Medial column of erector spinae muscle

Horizontal section through the trunk, superior to arcuate line (inferior aspect).



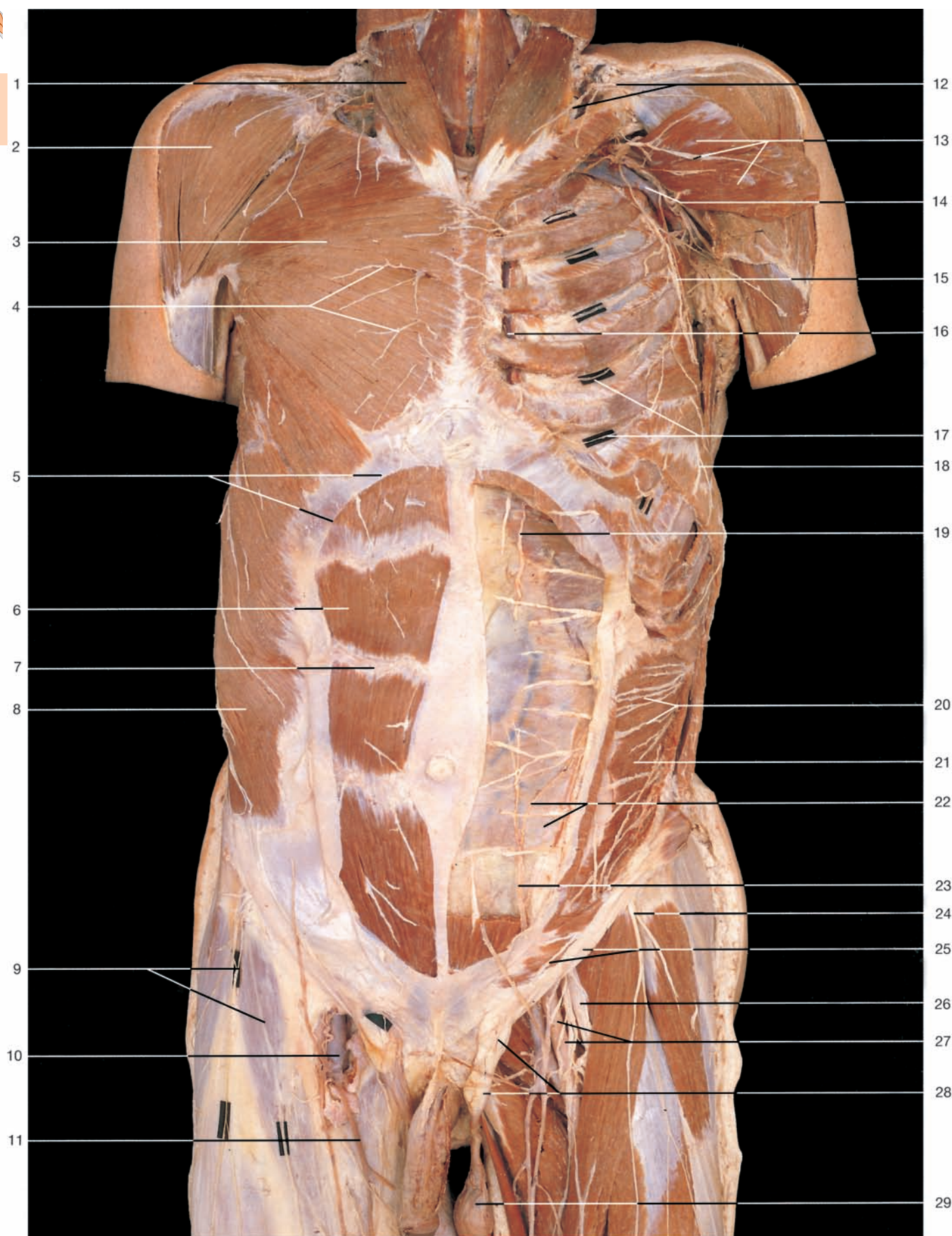
- 1 Rectus abdominis muscle (reflected)
- 2 External abdominal oblique muscle (divided)
- 3 Posterior layer of rectus sheath
- 4 Umbilical ring
- 5 Internal abdominal oblique muscle
- 6 Arcuate line (arrow)
- 7 Inguinal ligament
- 8 Inferior epigastric artery and vein and rectus abdominis muscle (divided and reflected)
- 9 Costal margin
- 10 Linea alba
- 11 Tendinous intersection
- 12 Iliohypogastric nerve
- 13 Ilio-inguinal nerve
- 14 Pyramidal muscle
- 15 Spermatic cord

Thoracic and abdominal walls (anterior aspect). External abdominal oblique muscle has been divided and reflected on both sides. The right rectus muscle has been cut and reflected to display the posterior layer of rectus sheath. Arrow: location of arcuate line.

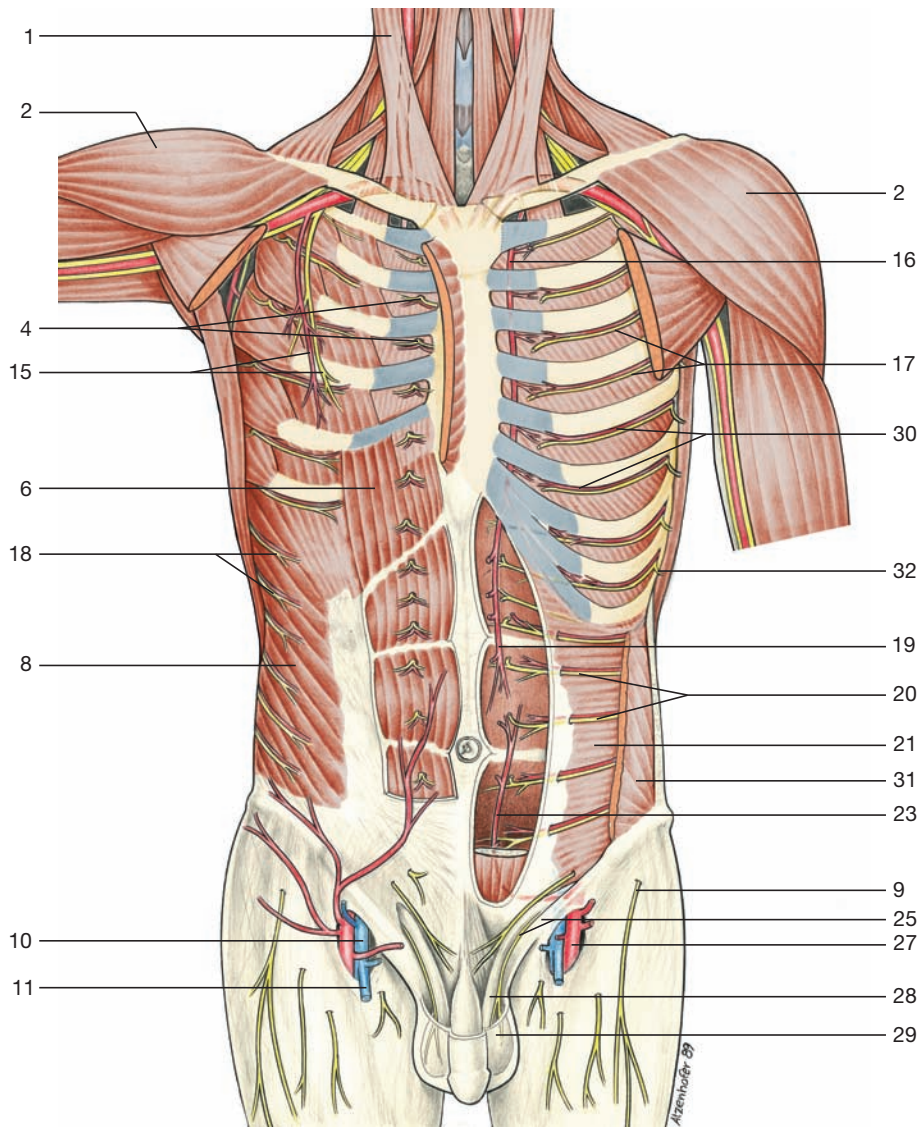


- 1 Linea alba
- 2 Rectus abdominis muscle
- 3 Epidermis
- 4 Fascia of external abdominal oblique muscle (green)
- 5 External abdominal oblique muscle
- 6 Internal abdominal oblique muscle
- 7 Transverse abdominal muscle
- 8 Transversalis fascia (green)
- 9 Peritoneum

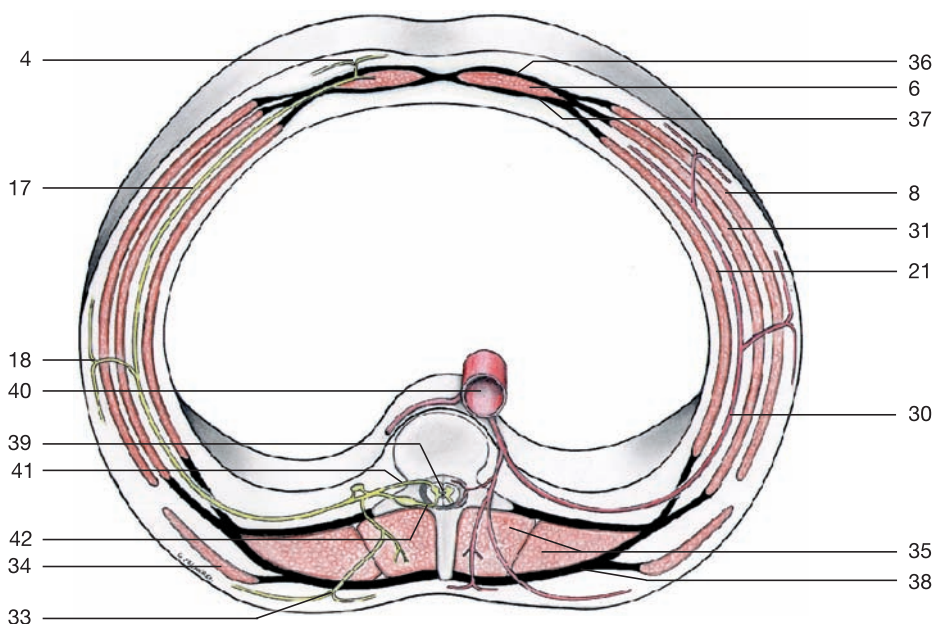
Transverse sections through the abdominal wall
a) superior and
b) inferior to arcuate line.



Thoracic and abdominal walls with vessels and nerves (anterior aspect). Right side: superficial layers; left side: deeper layers. Pectoralis major and minor muscles and the external and internal intercostal muscles on the left side have been removed to display the intercostal nerves. The anterior layer of rectus sheath, the left rectus abdominis muscle, and the external and internal abdominal oblique muscles have been removed to show the thoraco-abdominal nerves within the abdominal wall.

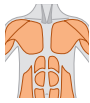


Thoracic and abdominal walls with vessels and nerves (anterior aspect). Right side: superficial layers; left side: deeper layers. Note the segmental organization of the blood vessels and nerves.



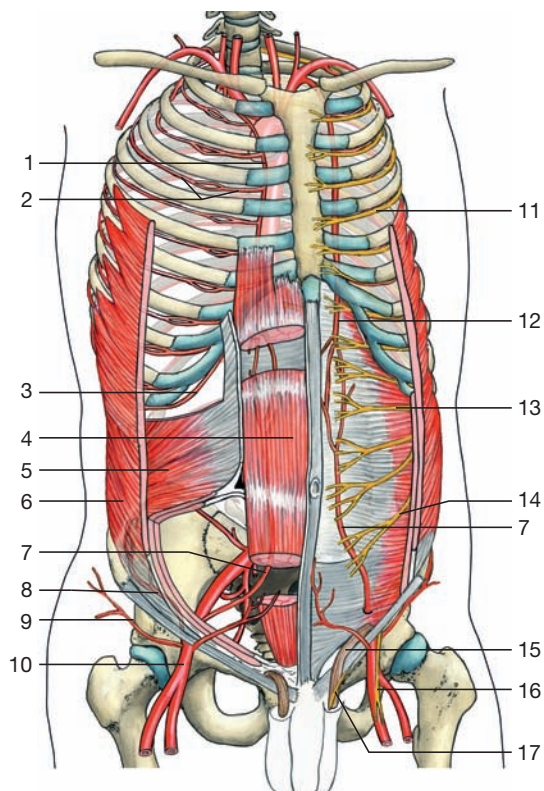
- 1 Sternocleidomastoid muscle
- 2 Deltoid muscle
- 3 Pectoralis major muscle
- 4 Anterior cutaneous branches of intercostal nerves
- 5 Cut edge of anterior layer of rectus sheath
- 6 Rectus abdominis muscle
- 7 Tendinous intersection
- 8 External abdominal oblique muscle
- 9 Lateral femoral cutaneous nerve
- 10 Femoral vein
- 11 Great saphenous vein
- 12 Medial supraclavicular nerves
- 13 Pectoralis minor muscle (reflected) and medial pectoral nerves
- 14 Axillary vein
- 15 Long thoracic nerve and lateral thoracic artery
- 16 Internal thoracic artery
- 17 Intercostal nerves
- 18 Lateral cutaneous branches of intercostal nerves
- 19 Superior epigastric artery
- 20 Thoraco-abdominal (intercostal) nerves
- 21 Transverse abdominal muscle
- 22 Posterior layer of rectus sheath
- 23 Inferior epigastric artery
- 24 Lateral femoral cutaneous nerve
- 25 Inguinal ligament and ilio-inguinal nerve
- 26 Femoral nerve
- 27 Femoral artery
- 28 Spermatic cord
- 29 Testis
- 30 Posterior intercostal arteries
- 31 Internal abdominal oblique muscle
- 32 Lateral cutaneous branch of intercostal nerve
- 33 Dorsal branch of spinal nerve
- 34 Latissimus dorsi muscle
- 35 Deep muscles of the back (medial and lateral tract)
- 36 Anterior layer of rectus sheath
- 37 Posterior layer of rectus sheath
- 38 Thoracolumbar fascia
- 39 Spinal cord
- 40 Aorta
- 41 Ventral root } of spinal nerve
- 42 Dorsal root }

Horizontal section through the abdominal wall (inferior aspect) showing the location of the intercostal arteries (left side) and nerves (right side).



- 1 Rectus abdominis muscle
- 2 Tendinous intersection
- 3 Internal abdominal oblique muscle
- 4 External abdominal oblique muscle (reflected)
- 5 Anterior superior iliac spine
- 6 Ilio-inguinal nerve
- 7 Spermatic cord
- 8 Costal margin
- 9 Superior epigastric artery
- 10 Thoraco-abdominal (intercostal) nerves
- 11 Posterior layer of rectus sheath
- 12 Transverse abdominal muscle
- 13 Semilunar line
- 14 Arcuate line
- 15 Inferior epigastric artery
- 16 Inguinal ligament

Abdominal wall with vessels and nerves (anterior aspect). The left rectus abdominis muscle has been divided and reflected to display the inferior epigastric vessels. The left internal abdominal oblique muscle has been removed to show the thoraco-abdominal nerves.



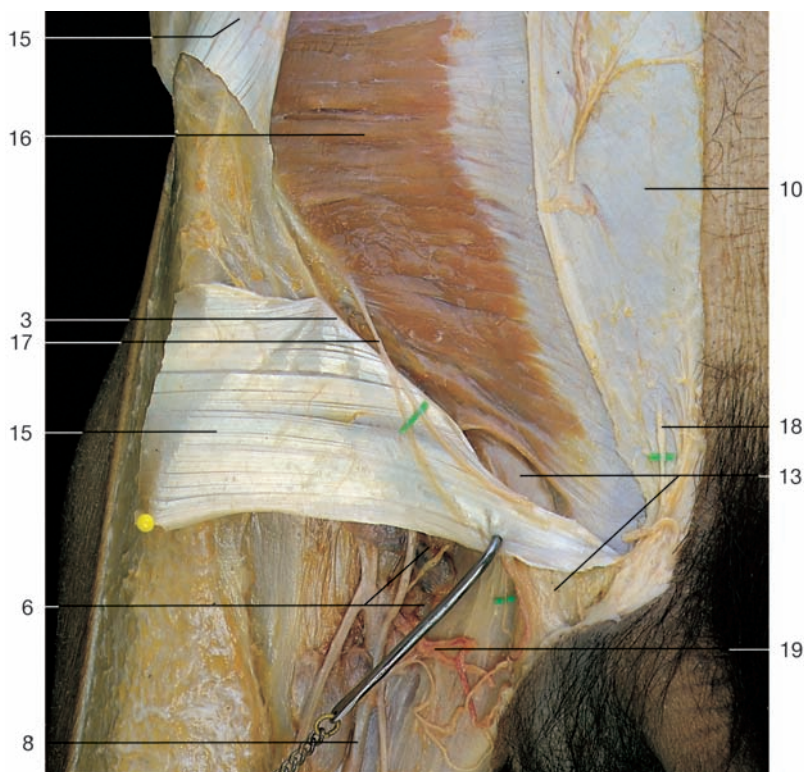
- 1 Internal thoracic artery
- 2 Intercostal artery
- 3 Musculophrenic artery
- 4 Rectus abdominis muscle
- 5 Internal abdominal oblique muscle
- 6 External abdominal oblique muscle
- 7 Inferior epigastric artery
- 8 Deep circumflex iliac artery
- 9 Superficial circumflex iliac artery
- 10 Femoral artery
- 11 Intercostal nerve
- 12 Superior epigastric artery
- 13 Intercostal nerve
- 14 Iliohypogastric nerve (L_1)
- 15 Spermatic cord
- 16 Femoral branch of genitofemoral nerve
- 17 Genital branch of genitofemoral nerve

Thoracic and abdominal walls with arteries and nerves (anterior aspect).

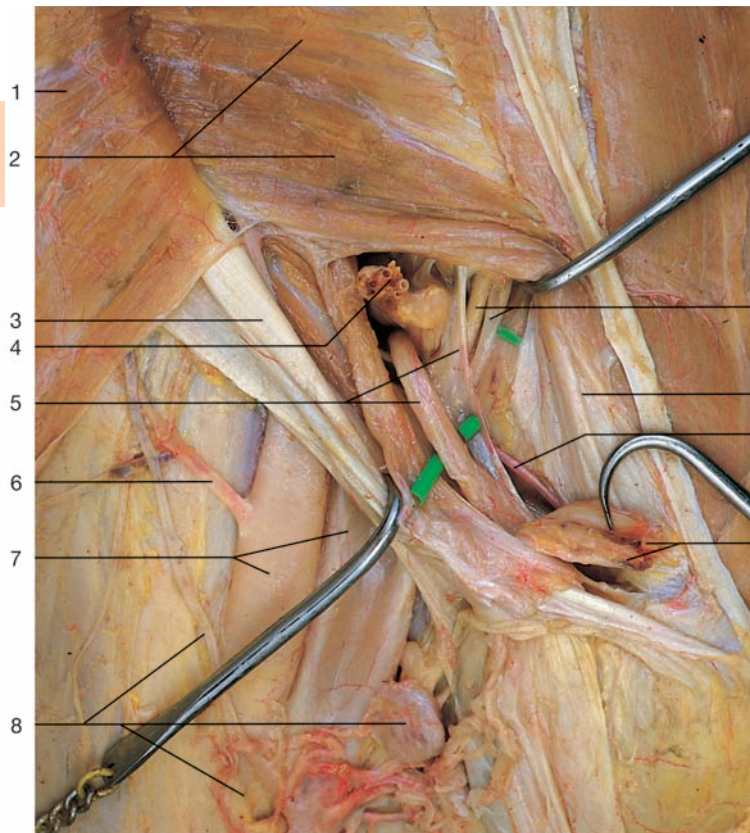
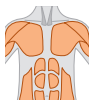


- 1 Aponeurosis of external abdominal oblique muscle
- 2 Superficial circumflex iliac vein
- 3 Inguinal ligament
- 4 Lateral crus of inguinal ring
- 5 Superficial epigastric vein
- 6 Saphenous opening
- 7 Femoral artery and vein
- 8 Great saphenous vein
- 9 Anterior cutaneous branches of femoral nerve
- 10 Anterior layer of rectus sheath
- 11 Intercrural fibers
- 12 Superficial inguinal ring
- 13 Spermatic cord and genital branch of genitofemoral nerve
- 14 Penis with dorsal nerves and deep dorsal vein of penis
- 15 Aponeurosis of external abdominal oblique muscle (divided and reflected)
- 16 Internal abdominal oblique muscle
- 17 Ilio-inguinal nerve
- 18 Anterior cutaneous branches of iliohypogastric nerve
- 19 Superficial external pudendal veins

Inguinal canal in the male, right side (superficial layer, anterior aspect). There is a small inguinal hernia (arrow).

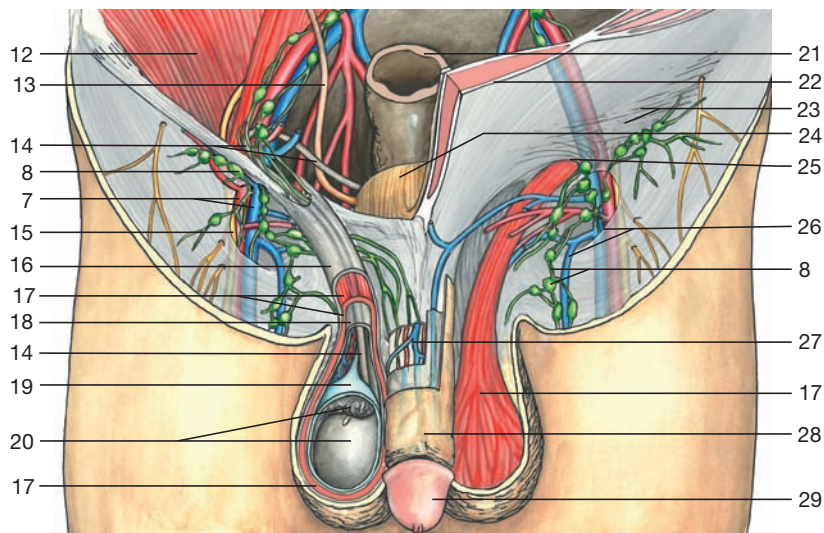


Inguinal canal in the male, right side (superficial layer, anterior aspect). The external abdominal oblique muscle has been divided to display the inguinal canal.



Inguinal canal in the male, right side (deep layer, anterior aspect).
Spermatic cord with exception of ductus deferens (probe) has been divided and reflected.

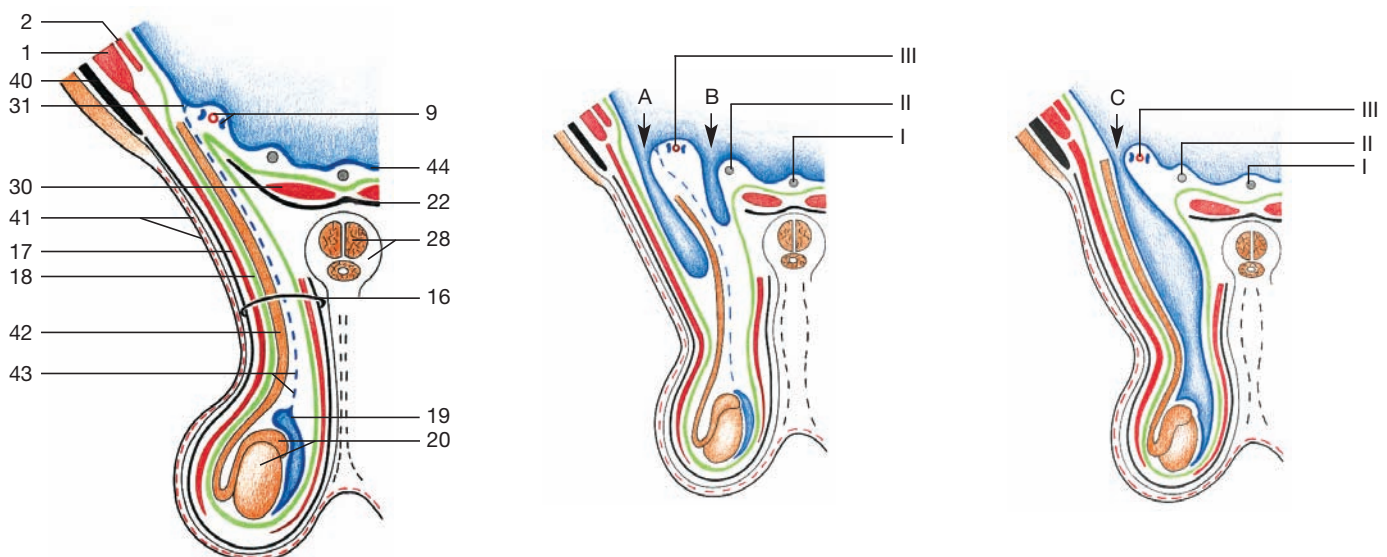
- 1 Internal abdominal oblique muscle (reflected)
- 2 Transverse abdominal muscle
- 3 Inguinal ligament
- 4 Spermatic cord with the exception of the ductus deferens (divided and reflected)
- 5 Ductus deferens and interfoveolar ligament
- 6 Superficial circumflex iliac artery
- 7 Femoral artery and vein
- 8 Superficial inguinal lymph nodes and inguinal lymph vessel
- 9 Inferior epigastric artery and vein
- 10 Falx inguinalis or conjoint tendon (cut)
- 11 Pubic branch of inferior epigastric artery
- 12 Iliacus muscle
- 13 Ureter
- 14 Ductus deferens (in situ)
- 15 Femoral nerve
- 16 Spermatic cord with ductus deferens and external spermatic fascia
- 17 Cremaster muscle
- 18 Internal spermatic fascia
- 19 Tunica vaginalis testis
- 20 Testis and epididymis
- 21 Rectum
- 22 Anterior layer of rectus sheath
- 23 Intercrural fibrae
- 24 Urinary bladder
- 25 Superficial inguinal ring
- 26 Saphenous opening with great saphenous vein
- 27 Deep dorsal vein of penis
- 28 Penis
- 29 Glans of penis
- 30 Rectus abdominis muscle
- 31 Deep inguinal ring
- 32 Pampiniform venous plexus and testicular artery
- 33 Fascia lata and sartorius muscle
- 34 Anterior superior iliac spine
- 35 Inferior epigastric artery
- 36 Lateral femoral cutaneous nerve
- 37 Ilioinguinal nerve
- 38 Suspensory ligament of penis
- 39 Sartorius muscle
- 40 External abdominal oblique muscle
- 41 Dartos fascia and scrotal skin
- 42 Ductus deferens
- 43 Vaginal process
- 44 Peritoneum



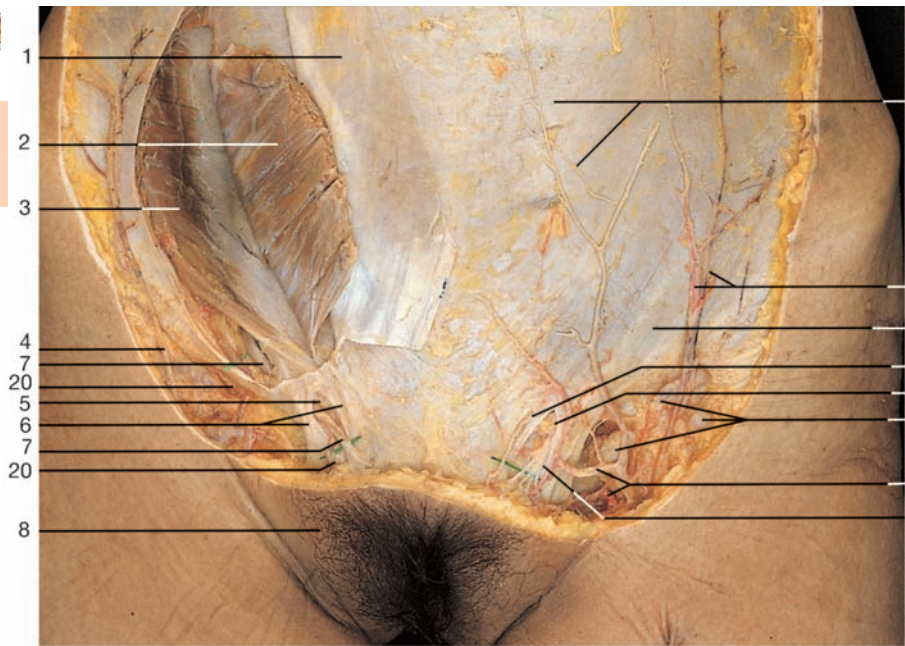
General characteristics of lower part of anterior abdominal wall and inguinal canal.



Inguinal and femoral regions in the male (anterior aspect). On the right, the spermatic cord was dissected to display the ductus deferens and the accompanying vessels and nerves. The fascia lata on the left side has been removed.

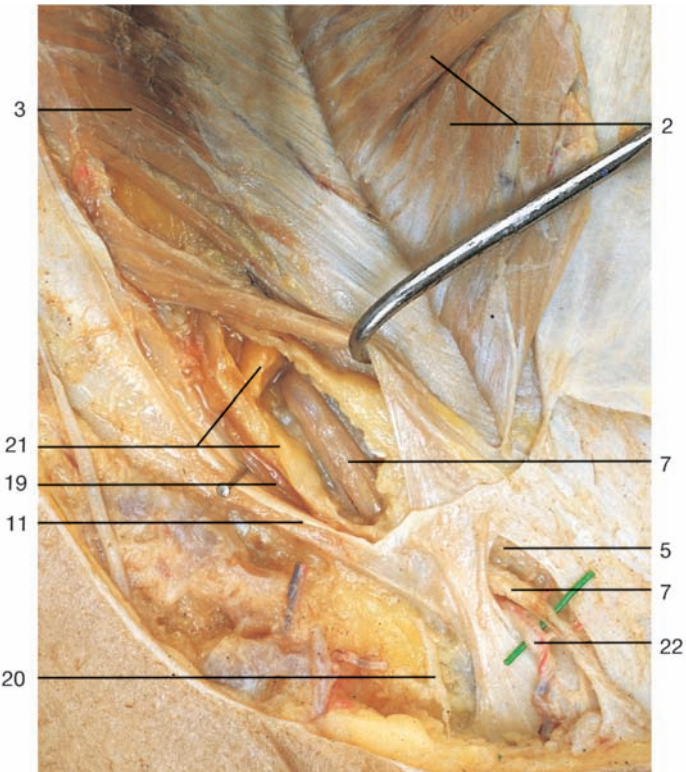


Layers of spermatic cord and types of hernias. Left: normal situation. Middle: location of acquired inguinal hernias: A = indirect inguinal hernia; B = direct inguinal hernia. Right: congenital indirect inguinal hernia (C); the vaginal process remained open.
 I = Median umbilical fold containing urachus chord.
 II = Medial umbilical fold with remnants of umbilical artery.
 III = Lateral umbilical fold with inferior epigastric artery and vein.

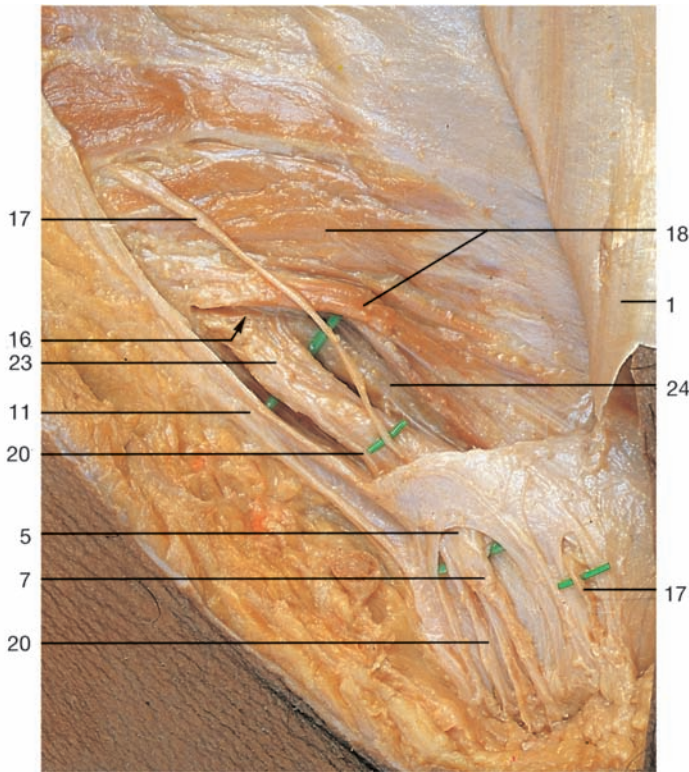


- 1 Aponeurosis of external abdominal oblique muscle
- 2 Internal abdominal oblique muscle (divided and reflected)
- 3 Transverse abdominal muscle
- 4 Superficial circumflex iliac artery and vein
- 5 Superficial inguinal ring with fat pad
- 6 Medial and lateral crural fibers
- 7 Round ligament (ligamentum teres uteri)
- 8 Labium majus pudendi
- 9 Anterior layer of rectus sheath
- 10 Superficial epigastric artery and vein
- 11 Inguinal ligament
- 12 Cutaneous branch of ilio-inguinal nerve
- 13 Superficial inguinal lymph nodes
- 14 Entrance of round ligament into the labium majus
- 15 External pudendal artery and vein
- 16 Position of deep inguinal ring
- 17 Ilio-inguinal nerve
- 18 Internal abdominal oblique muscle
- 19 Pubic branch of inferior epigastric artery
- 20 Genital branch of genitofemoral nerve
- 21 Fat pad of inguinal canal
- 22 Ilio-inguinal nerve
- 23 Sheath of round ligament (inguinal canal)
- 24 Transversalis fascia

Inguinal region in the female (anterior aspect). Left side: superficial layer; right side: external and internal abdominal oblique muscles divided and reflected.



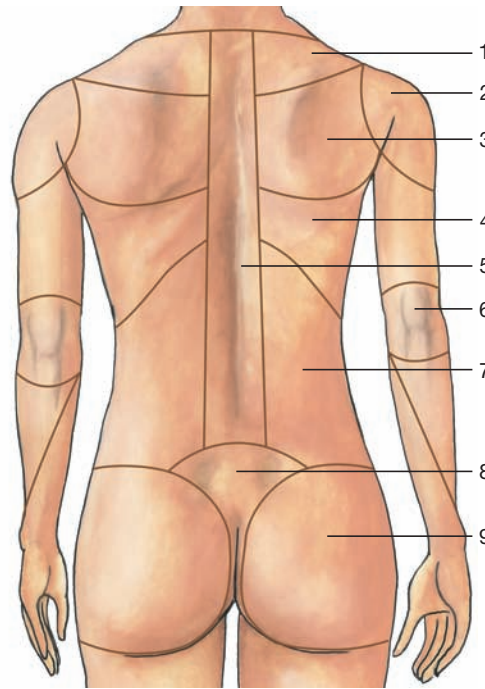
Inguinal canal in the female, right side (anterior aspect). The external abdominal oblique muscle has been divided and reflected to display the ilio-inguinal nerve and the round ligament.



Inguinal canal in the female, right side (anterior aspect). The external and internal abdominal oblique muscles have been divided and reflected to show the content of the inguinal canal.

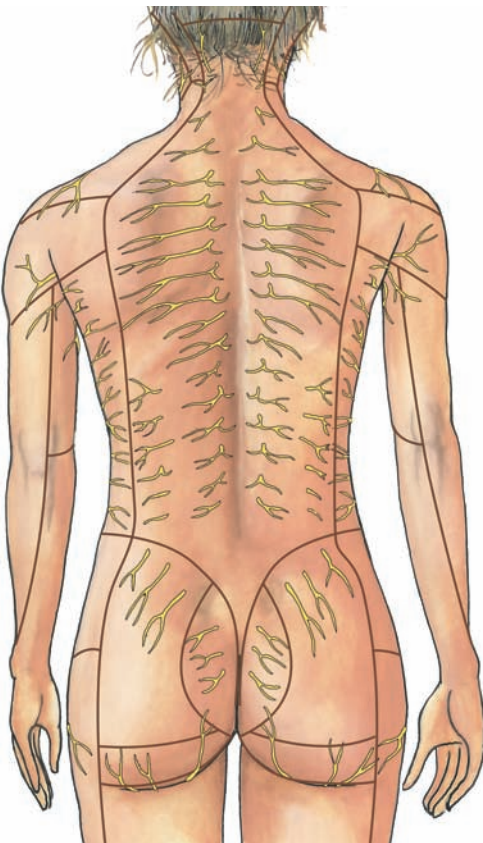


Back of a strong man. Borderlines indicate the scapula and the trapezius muscle.

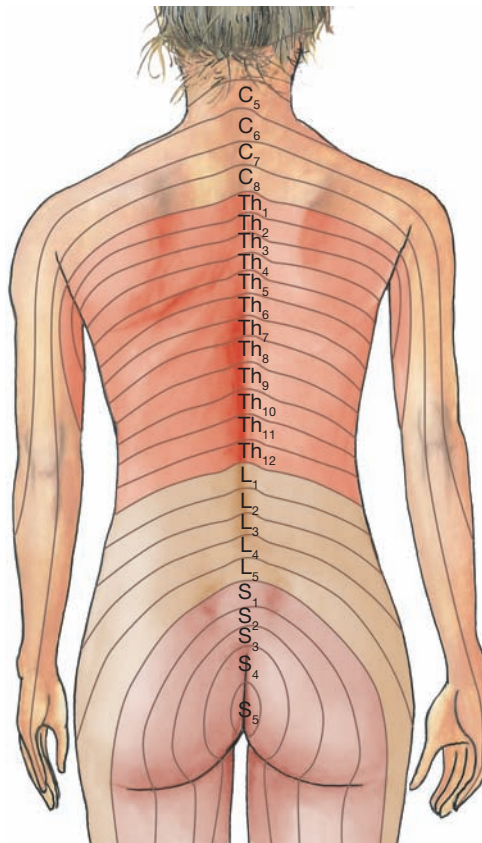


Regions of the back in the female.

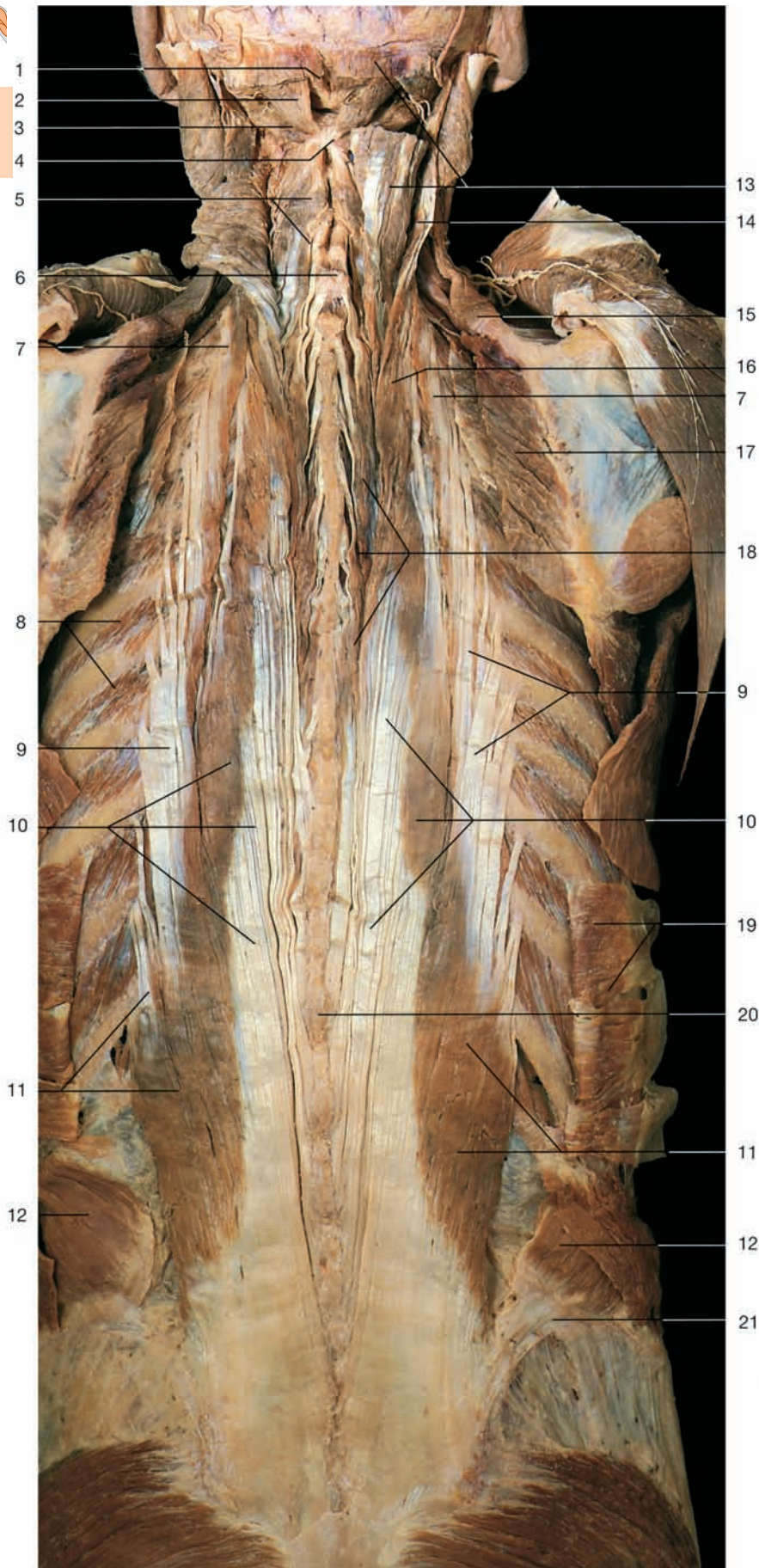
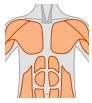
- 1 Suprascapular region
- 2 Deltoid region
- 3 Scapular region
- 4 Infrascapular region
- 5 Vertebral region
- 6 Posterior cubital region
- 7 Lumbar region
- 8 Sacral region
- 9 Gluteal region



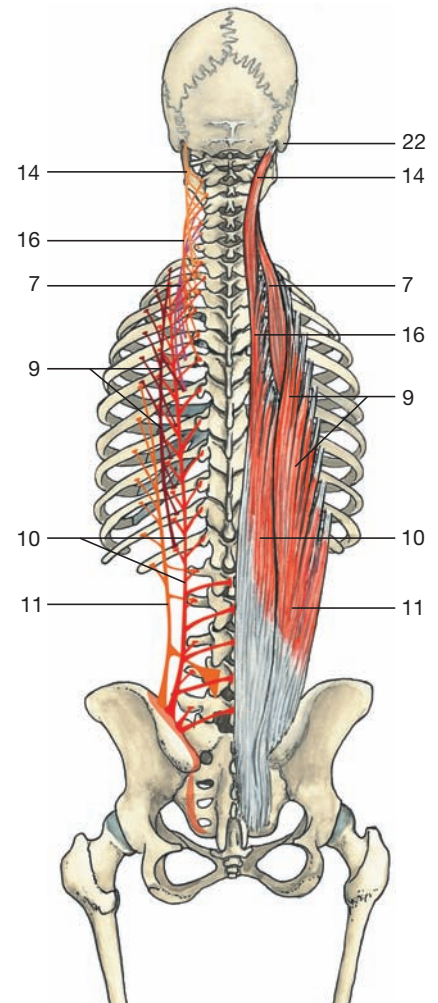
Innervation of the back. The dorsal branches of the spinal nerves display a segmental arrangement. The segmental innervation regions of the back are indicated.



Segmental arrangement of the back. Cervical (C₁–C₈; only shown are C₅–C₈), thoracic (Th₁–Th₁₂), lumbar (L₁–L₅), and sacral (S₁–S₅) segments are colored different.

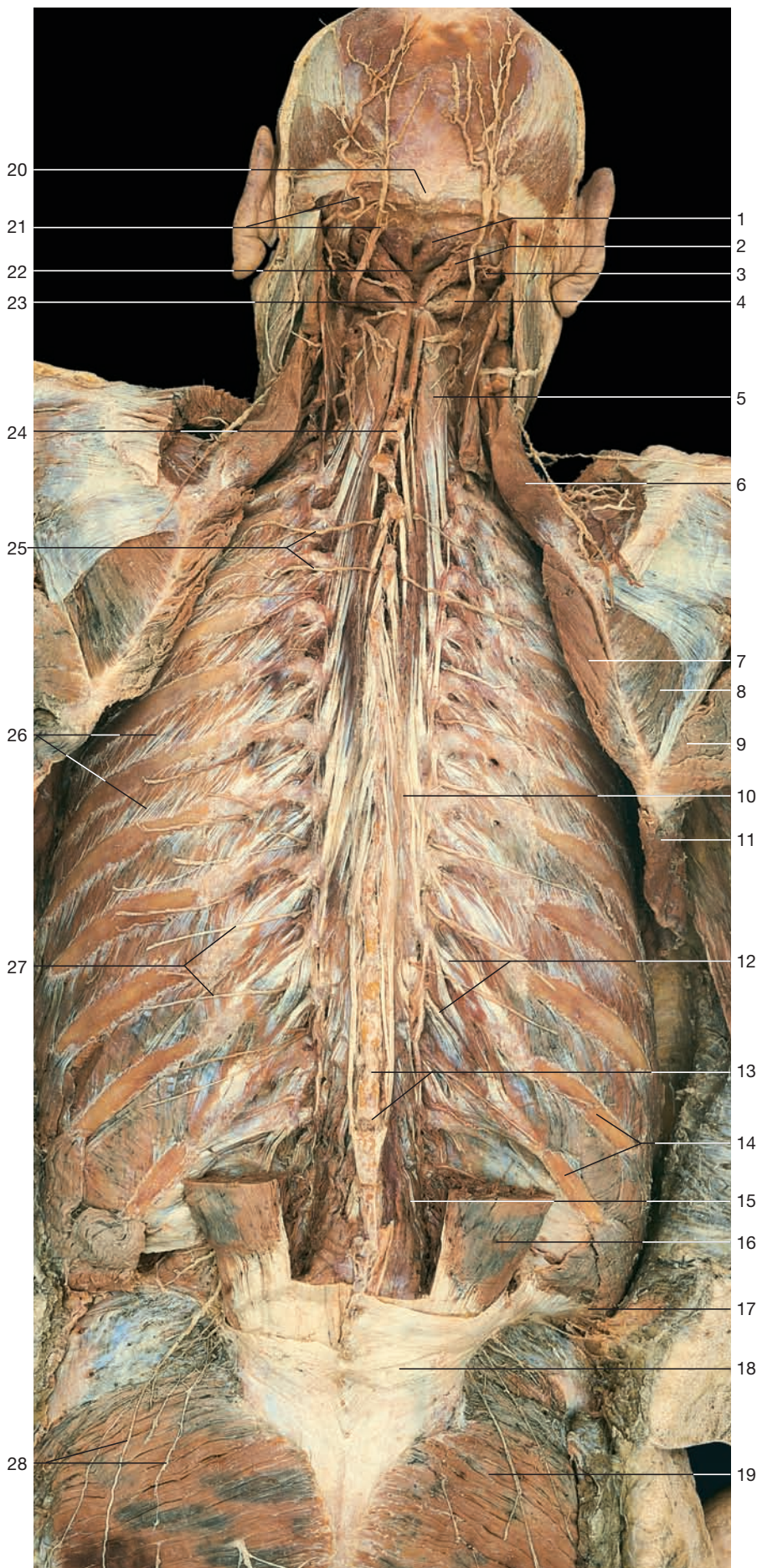


Muscles of the back. Dissection of the erector spinae muscle (lateral column of the intrinsic back muscles).



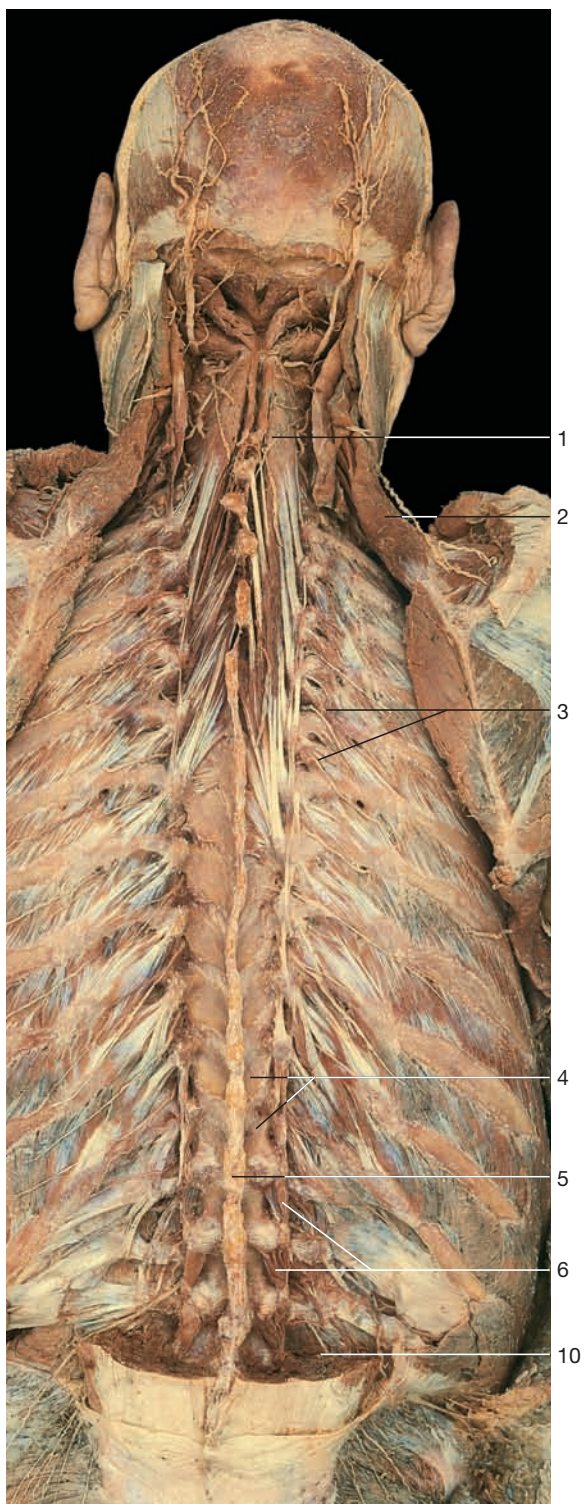
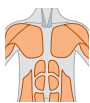
Origin and insertion of erector spinae muscle (sacrospinal system).

- 1 Rectus capitis posterior minor muscle
- 2 Rectus capitis posterior major muscle
- 3 Obliquus capitis inferior muscle
- 4 Spinous process of axis
- 5 Semispinalis cervicis muscle
- 6 Spinous process of seventh cervical vertebra
- 7 Iliocostalis cervicis muscle
- 8 External intercostal muscles
- 9 Iliocostalis thoracis muscle
- 10 Longissimus thoracis muscle
- 11 Iliocostalis lumborum muscle
- 12 Internal abdominal oblique muscle
- 13 Semispinalis capitis muscle (divided)
- 14 Longissimus capitis muscle
- 15 Levator scapulae muscle
- 16 Longissimus cervicis muscle
- 17 Rhomboid major muscle
- 18 Spinalis thoracis muscle
- 19 Serratus posterior inferior muscle (reflected)
- 20 Spinous process of second lumbar vertebra
- 21 Iliac crest
- 22 Mastoid process

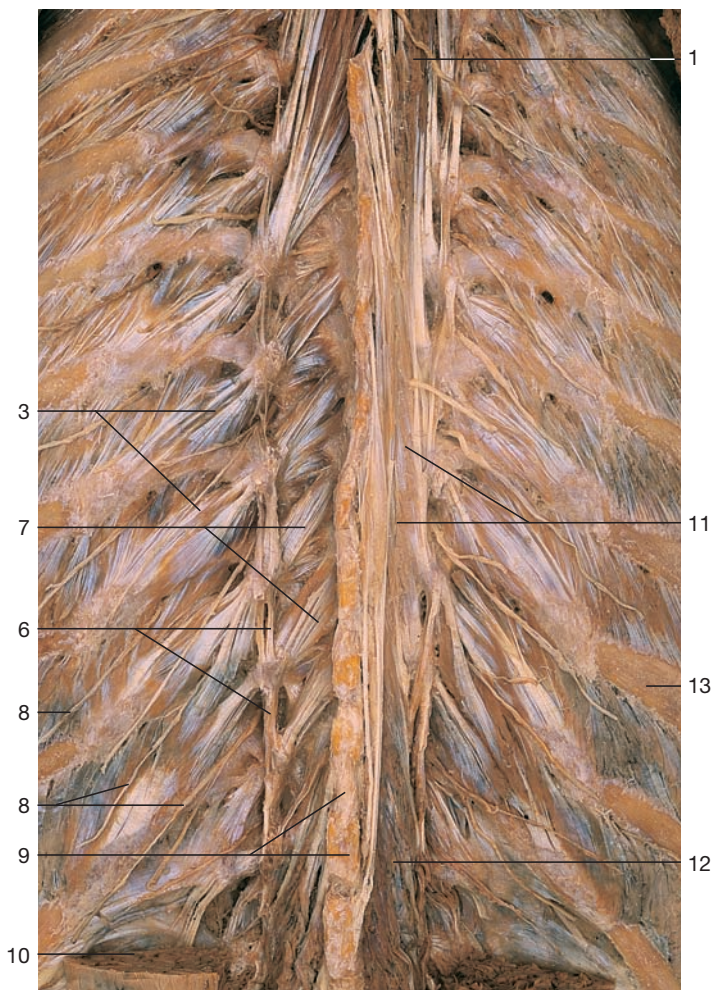


- 1 Rectus capitis posterior minor muscle
- 2 Rectus capitis posterior major muscle
- 3 Obliquus capitis superior muscle
- 4 Obliquus capitis inferior muscle
- 5 Semispinalis cervicis muscle
- 6 Levator scapulae muscle
- 7 Rhomboideus major muscle
- 8 Scapula with infraspinatus muscle
- 9 Teres major muscle
- 10 Spinalis muscle
- 11 Latissimus dorsi muscle
- 12 Levatores costarum muscles
- 13 Spinous processes of lumbar vertebrae
- 14 Ribs (Th₁₁, Th₁₂)
- 15 Multifidus muscle
- 16 Longissimus and iliocostalis muscles (cut)
- 17 Iliac crest (lumbar triangle)
- 18 Thoracolumbar fascia
- 19 Gluteus maximus muscle
- 20 External occipital protuberance
- 21 Occipital artery and greater occipital nerve (C₂)
- 22 Posterior tubercle of atlas
- 23 Spinous process of axis
- 24 Spinous process of seventh cervical vertebra (vertebra prominens)
- 25 Medial branches of dorsal branches of spinal nerves
- 26 External intercostal muscles
- 27 Lateral branches of dorsal branches of spinal nerves
- 28 Superior cluneal nerves

Muscles of the back. Dissection of the deeper layer of the intrinsic back muscles. Longissimus and iliocostalis muscles are cut.

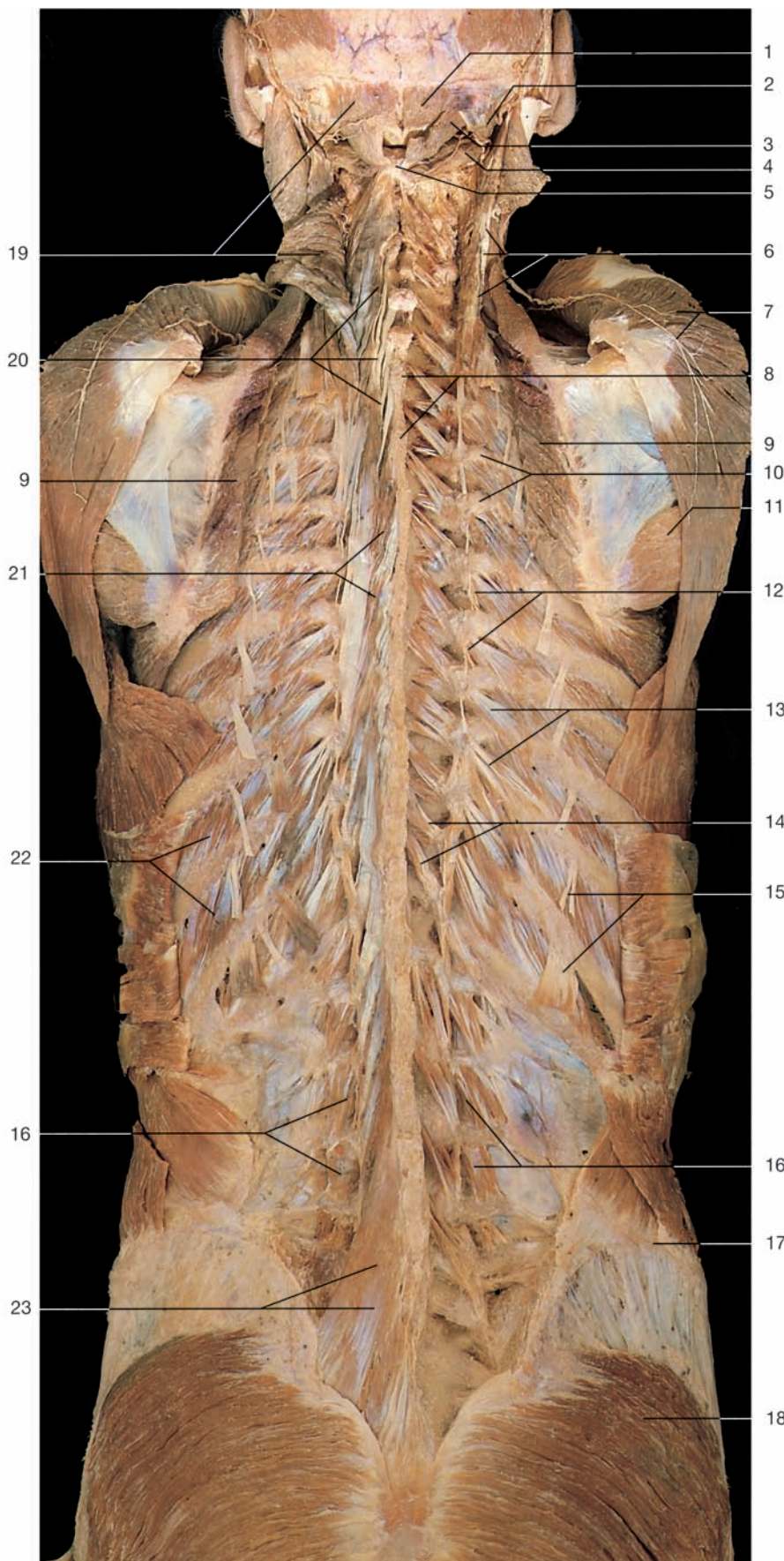


Muscles of the back (deepest layer).

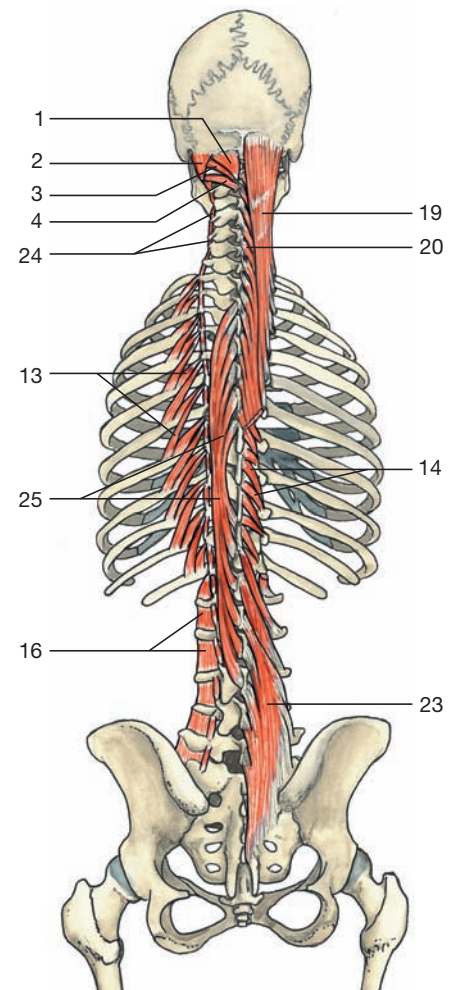


Muscles of the back (deepest layer). Lumbar region (higher magnification).

- 1 Semispinalis cervicis muscle
- 2 Levator scapulae muscle
- 3 Levatores costarum muscles
- 4 Vertebral arches of lumbar vertebrae
- 5 Supraspinal ligaments
- 6 Intertransverse lumbar muscles
- 7 Lumbar rotator muscles
- 8 Cutaneous branches of spinal nerves
- 9 Lumbar interspinal muscles
- 10 Longissimus and iliocostalis muscles (cut)
- 11 Spinal muscle of the back
- 12 Multifidus muscle
- 13 Tenth rib (T_{10})

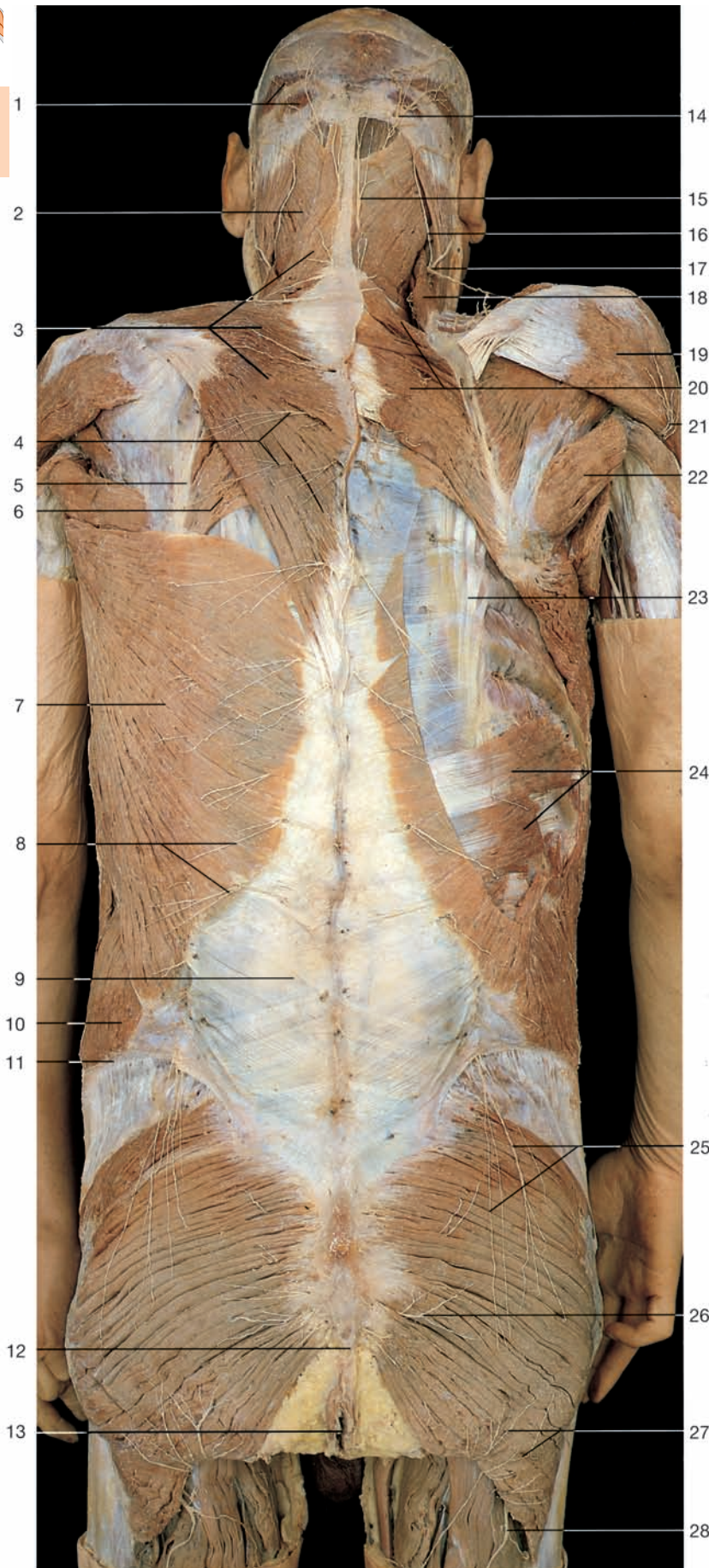
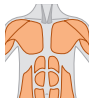


Muscles of the back. Transversospinal muscles, deepest layer on the right, where all parts of semispinalis and multifidus muscles have been removed.



Origin and insertion of erector spinae muscle, medial column (transversospinal and intertransversal system).

- 1 Rectus capitis posterior minor muscle
- 2 Obliquus capitis superior muscle
- 3 Rectus capitis posterior major muscle
- 4 Obliquus capitis inferior muscle
- 5 Spinous process of axis
- 6 Longissimus capitis muscle
- 7 Trapezius muscle (reflected) and accessory nerve (n. XI)
- 8 Spinous processes
- 9 Rhomboid major muscle
- 10 Transverse processes of thoracic vertebrae
- 11 Teres major muscle
- 12 Intertransverse ligaments
- 13 Levatores costarum muscles
- 14 Rotatores muscles
- 15 Tendons of iliocostalis muscle
- 16 Intertransversarii laterales lumborum muscles
- 17 Iliac crest
- 18 Gluteus maximus muscle
- 19 Semispinalis capitis muscle
- 20 Semispinalis cervicis muscle
- 21 Semispinalis thoracis muscle
- 22 External intercostal muscles
- 23 Multifidus muscle
- 24 Posterior cervical intertransversarii muscles
- 25 Spinalis thoracis muscle



- 1 Occipital belly of occipitofrontalis muscle
- 2 Splenius capitis muscle
- 3 Trapezius muscle
- 4 Medial cutaneous branches of dorsal rami of spinal nerves
- 5 Medial margin of scapula
- 6 Rhomboid major muscle
- 7 Latissimus dorsi muscle
- 8 Lateral cutaneous branches of dorsal rami of spinal nerves
- 9 Thoracolumbar fascia
- 10 External abdominal oblique muscle
- 11 Iliac crest
- 12 Last coccygeal vertebra
- 13 Anus
- 14 Greater occipital nerve
- 15 Third occipital nerve
- 16 Lesser occipital nerve
- 17 Cutaneous branches of cervical plexus
- 18 Levator scapulae muscle
- 19 Deltoid muscle
- 20 Rhomboid major and minor muscles
- 21 Upper lateral cutaneous nerve of arm (branch of axillary nerve)
- 22 Teres major muscle
- 23 Iliocostalis thoracis muscle
- 24 Serratus posterior inferior muscle
- 25 Superior cluneal nerves
- 26 Middle cluneal nerves
- 27 Inferior cluneal nerves
- 28 Posterior femoral cutaneous nerve

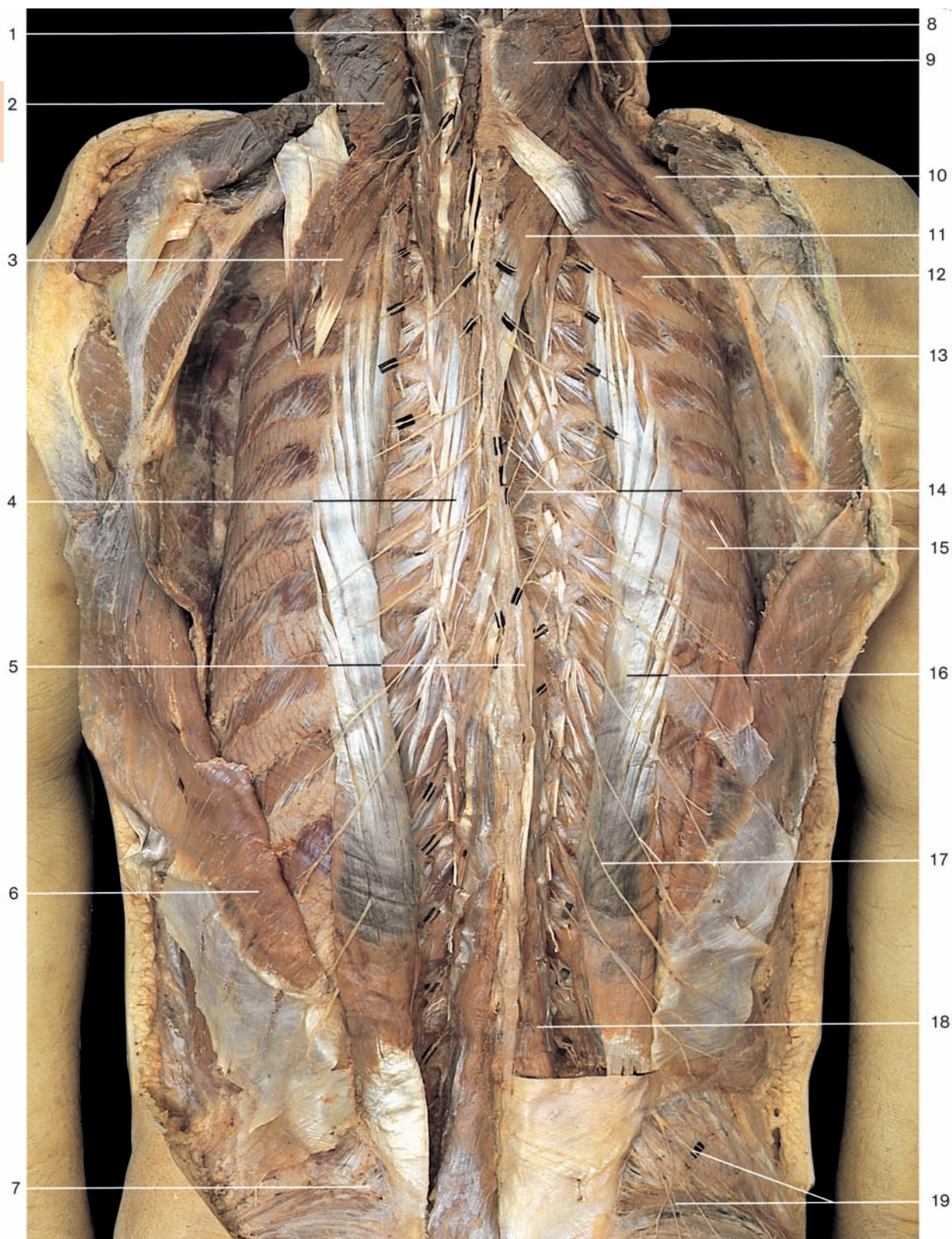
Innervation of the back (superficial [left] and deeper [right] layers).
Right trapezius and latissimus dorsi muscles have been removed.

▷ **To page 231:**

- 1 Trapezius muscle
- 2 Infraspinatus muscle
- 3 Left latissimus dorsi muscle
- 4 Thoracolumbar fascia
- 5 Splenius cervicis muscle
- 6 Serratus posterior superior muscle
- 7 Medial branches of dorsal rami of thoracic spinal nerves
- 8 Lateral branches of dorsal rami of thoracic spinal nerves
- 9 Iliocostalis muscle
- 10 Serratus posterior inferior muscle
- 11 Latissimus dorsi muscle (reflected)



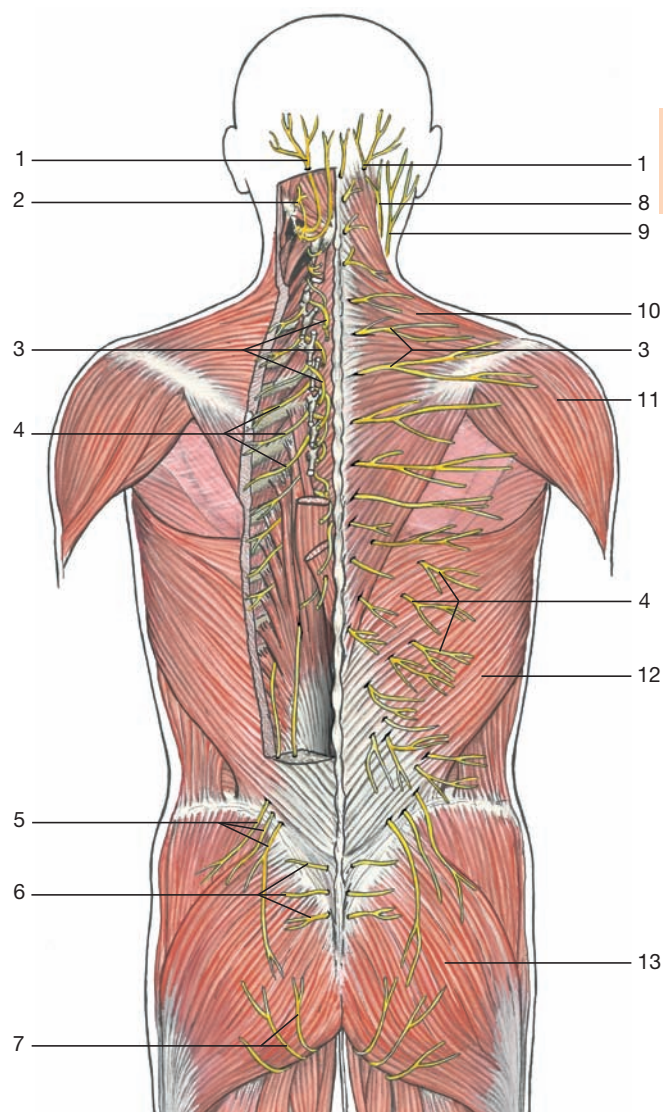
Innervation of the back. Dissection of the dorsal branches of the spinal nerves. On the right, longissimus thoracis muscle has been removed and iliocostalis muscle laterally reflected.



Innervation of the back (deeper layer).

- | | | |
|---|---------------------------------------|---|
| 1 Semispinalis capitis muscle | 7 Iliac crest | 14 Medial branches of dorsal rami of spinal nerves |
| 2 Left splenius capitis muscle (cut and reflected) | 8 Lesser occipital nerve | 15 Rib and external intercostal muscle |
| 3 Left splenius cervicis muscle (cut and reflected) | 9 Splenius capitis muscle | 16 Iliocostalis thoracis muscle |
| 4 Semispinalis thoracis muscle | 10 Levator scapulae muscle | 17 Lateral branches of dorsal rami of spinal nerves |
| 5 Spinalis thoracis muscle | 11 Splenius cervicis muscle | 18 Multifidus muscle |
| 6 Latissimus dorsi muscle (reflected) | 12 Serratus posterior superior muscle | 19 Superior cluneal nerves |
| | 13 Scapula | |

- 1 Greater occipital nerve (C_2)
- 2 Suboccipital nerve (C_1)
- 3 Medial branches of dorsal rami of spinal nerves
- 4 Lateral branches of dorsal rami of spinal nerves
- 5 Superior cluneal nerves (L_1-L_3)
- 6 Middle cluneal nerves (S_1-S_3)
- 7 Inferior cluneal nerves
(derived from branches of the sacral plexus, ventral rami)
- 8 Lesser occipital nerve
- 9 Great auricular nerve
- 10 Trapezius muscle
- 11 Deltoid muscle
- 12 Latissimus dorsi muscle
- 13 Gluteus maximus muscle
- 14 External intercostal muscle
- 15 Internal intercostal muscle
- 16 Innermost intercostal muscle
- 17 Dorsal ramus of spinal nerve
- 18 Spinal nerve and spinal ganglion
- 19 Sympathetic trunk with ganglion
- 20 Intercostal nerve
- 21 Lateral cutaneous branch } of intercostal nerve
- 22 Anterior cutaneous branch }
- 23 Longissimus thoracis muscle
- 24 Spinal cord
- 25 Aorta
- 26 Esophagus
- 27 Body of rib
- 28 Thoracic rib
- 29 Thoracic duct
- 30 Azygos vein

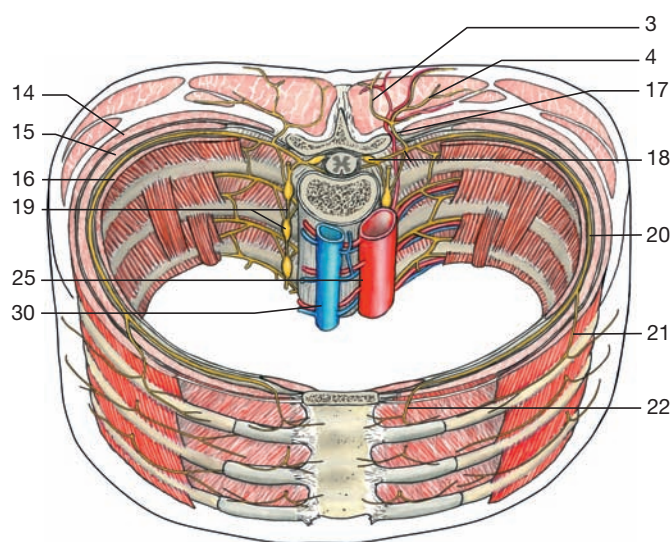


General characteristics of the innervation of the back.

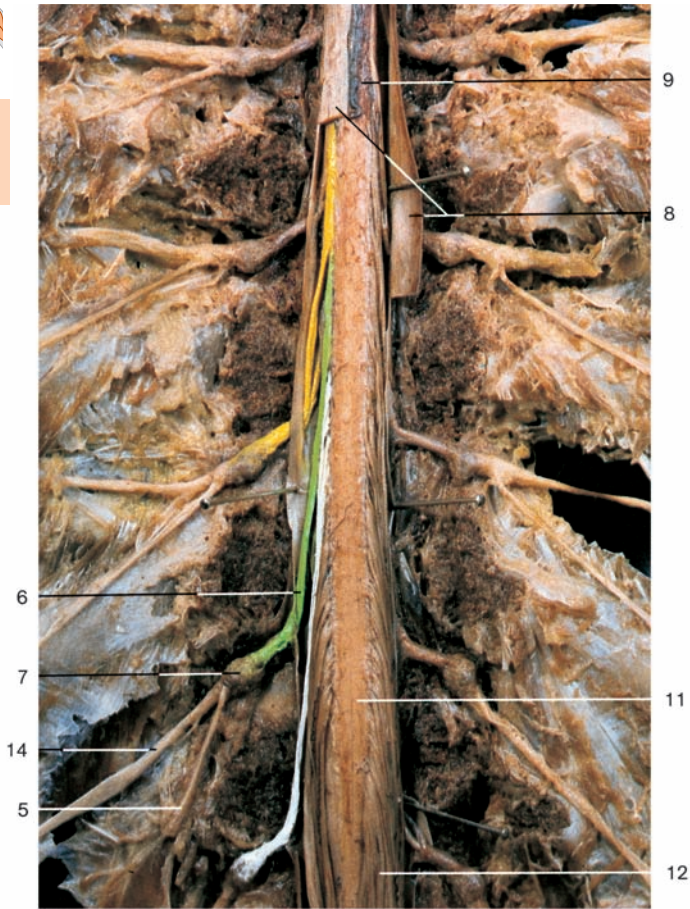
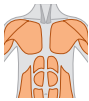
Distribution of dorsal branches of spinal nerves. Note the segmental arrangement of the innervation of the dorsal part of the trunk.



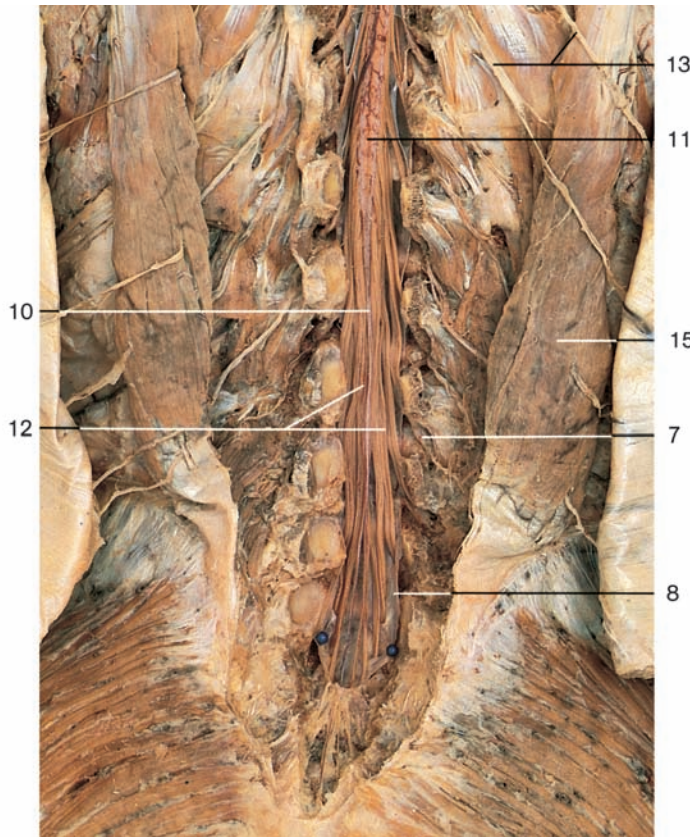
Horizontal section through the posterior part of the thoracic wall (MRI scan). (From Heuck et al., MRT-Atlas, 2009.)



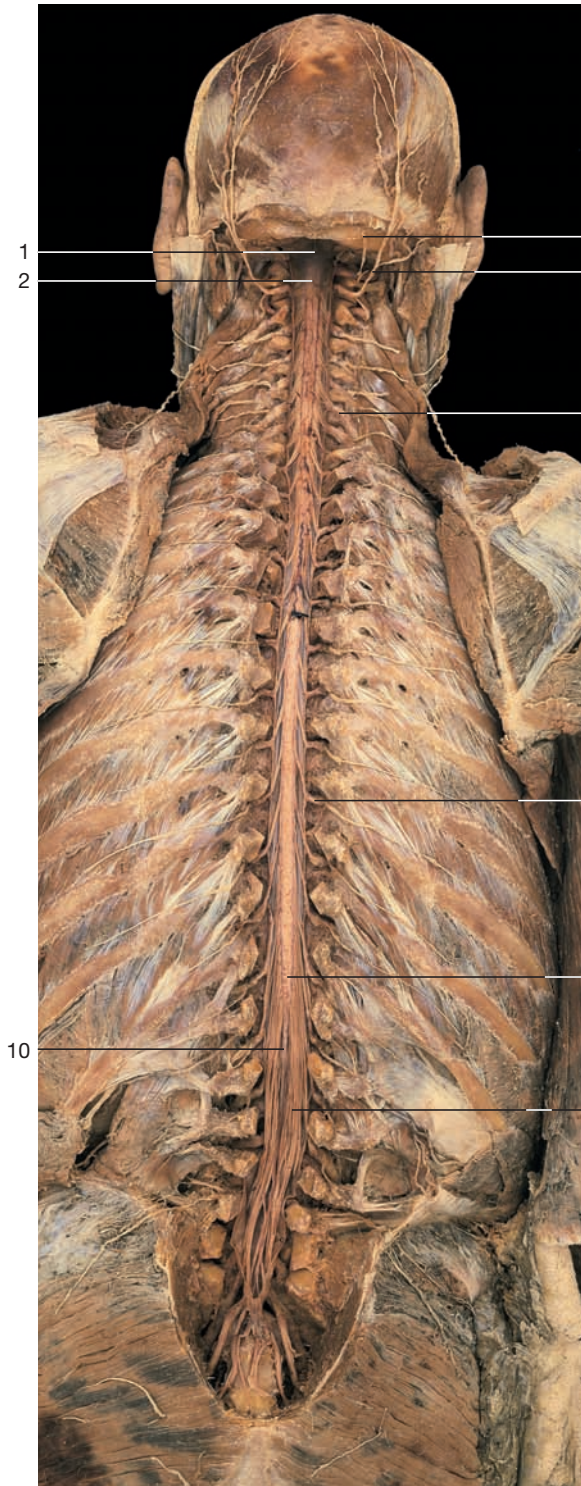
Horizontal section through the anterior and posterior parts of the thoracic wall. Position and branches of spinal nerves and vessels in one thoracic segment are shown.



Lumbar part of spinal cord (posterior aspect). Note the relation between the nervous and muscular segments.

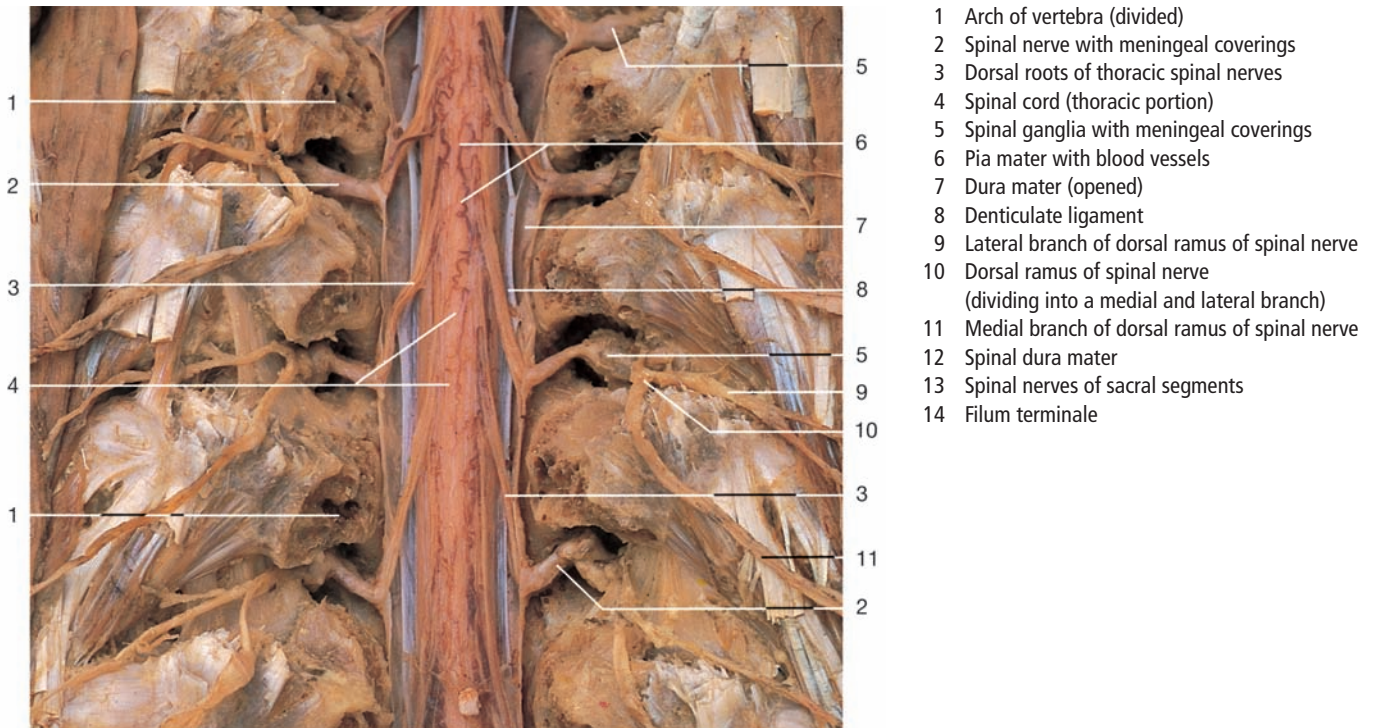


Terminal part of spinal cord (posterior aspect). The dura mater has been removed.

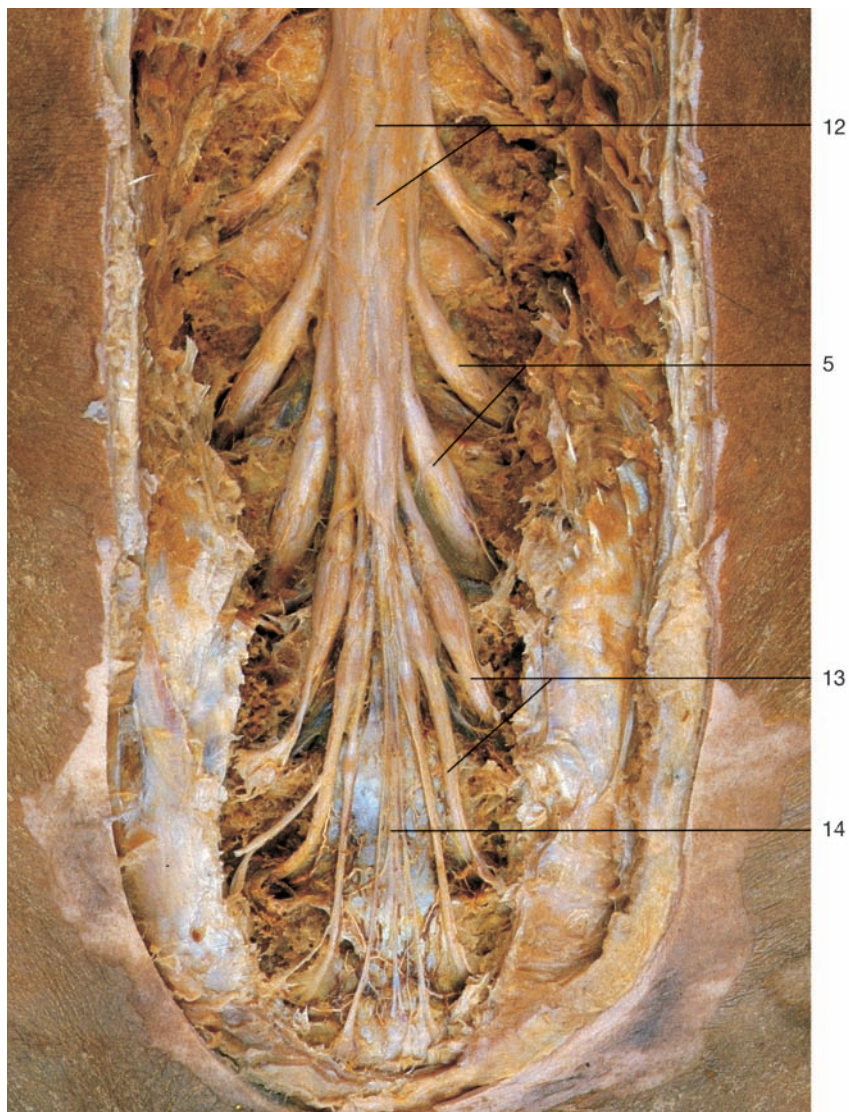


Spinal cord with spinal nerves and meningeal coverings. The vertebral canal has been opened. Longissimus dorsi and iliocostalis muscles have been removed.

- | | |
|---|--|
| 1 Cerebellomedullary cistern | 9 Spinal arachnoid mater |
| 2 Medulla oblongata | 10 Filum terminale |
| 3 Third cervical nerve (C ₃) | 11 Conus medullaris |
| 4 Greater occipital nerve (C ₂) | 12 Cauda equina |
| 5 Dorsal primary ramus | 13 Lateral branch of dorsal ramus of spinal nerve |
| 6 Dorsal roots | 14 Ventral ramus of spinal nerve (intercostal nerve) |
| 7 Spinal ganglion | 15 Iliocostalis muscle |
| 8 Spinal dura mater | |



Thoracic part of spinal cord (posterior aspect). Vertebral canal and dura mater have been opened.

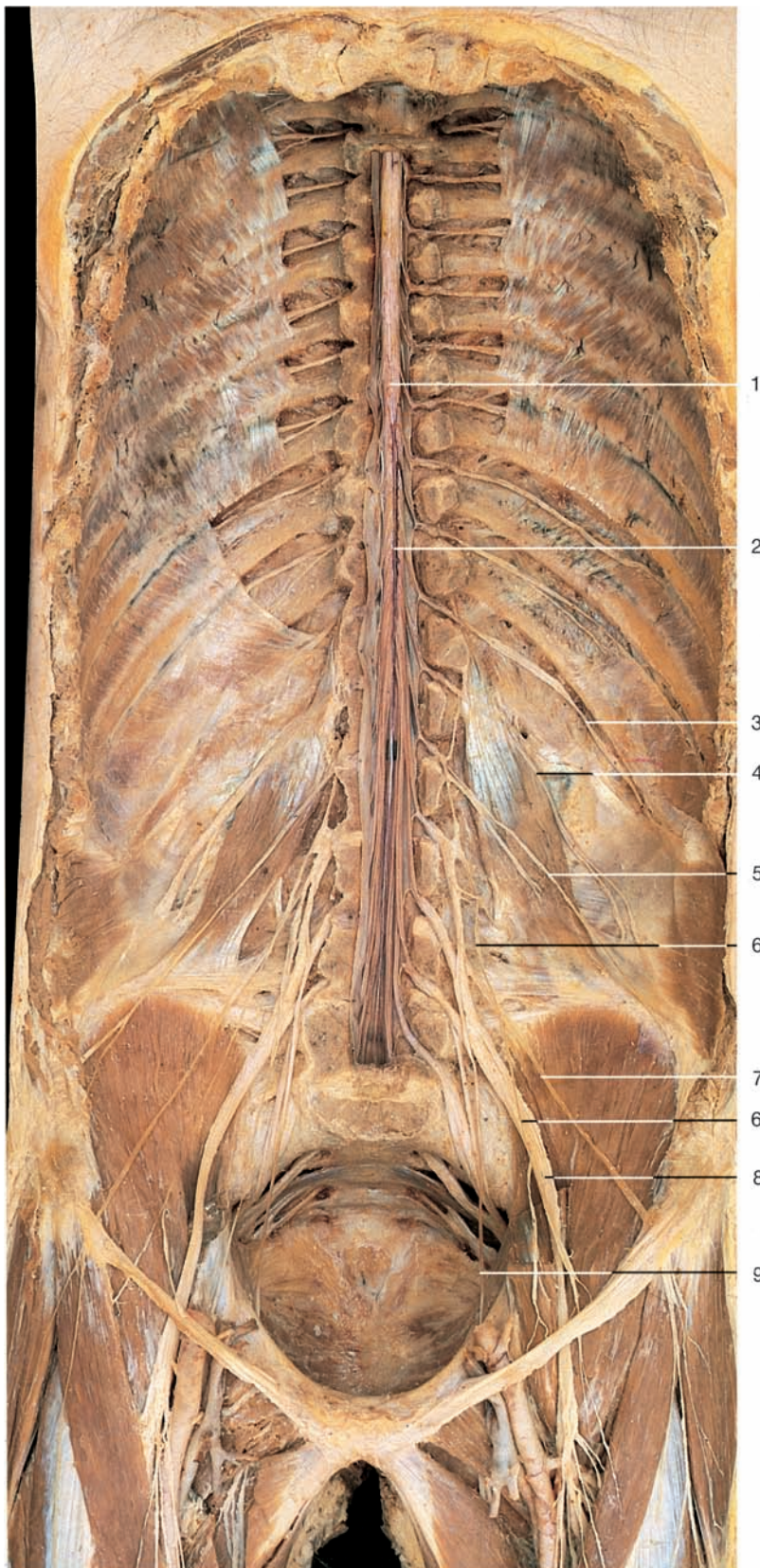


Terminal part of spinal cord with dura mater (posterior aspect). Dorsal part of sacrum has been removed.

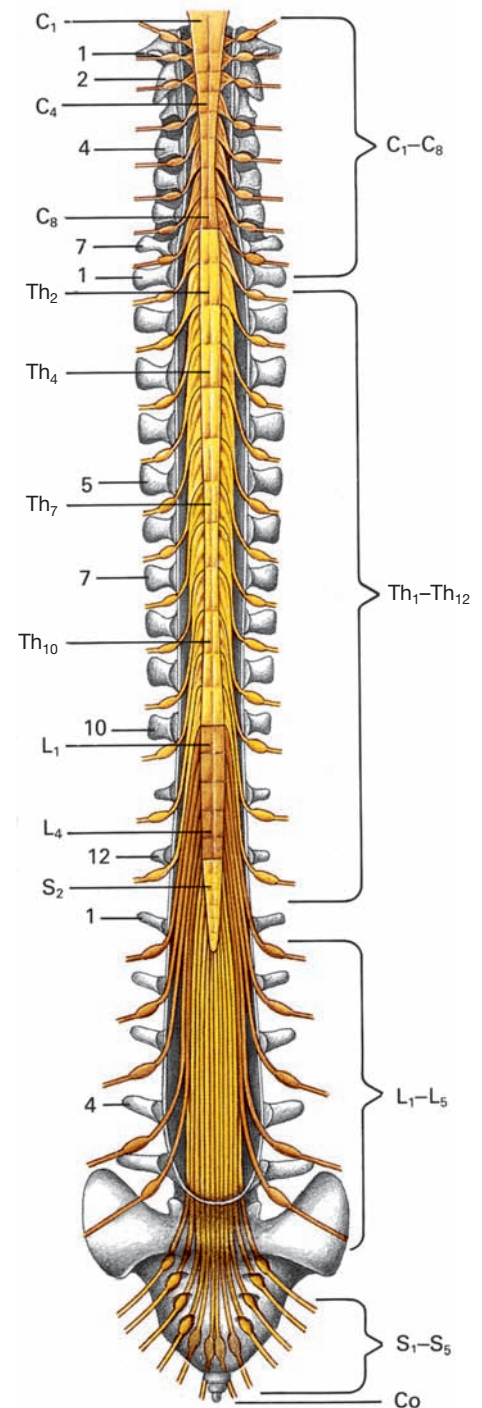


Spinal cord with intercostal nerves. Inferior thoracic region (anterior aspect). Anterior portion of thoracic vertebrae removed, dural sheath opened, and spinal cord slightly reflected to the right to display the dorsal and ventral roots.

- | | | |
|-----------------------------------|--|---|
| 1 Dura mater | 6 Eleventh rib | 10 Anterior root filaments |
| 2 Spinal cord | 7 Intercostal nerve | 11 Spinal (dorsal root) ganglion |
| 3 Costotransverse ligament | 8 Collateral branch of intercostal nerve | 12 Posterior root filaments |
| 4 Innermost intercostal muscle | 9 Intercostal nerve | 13 Arachnoid mater and denticulate ligament |
| 5 Vertebral arches (cut surfaces) | (entering the intermuscular interval) | 14 Anterior spinal artery |

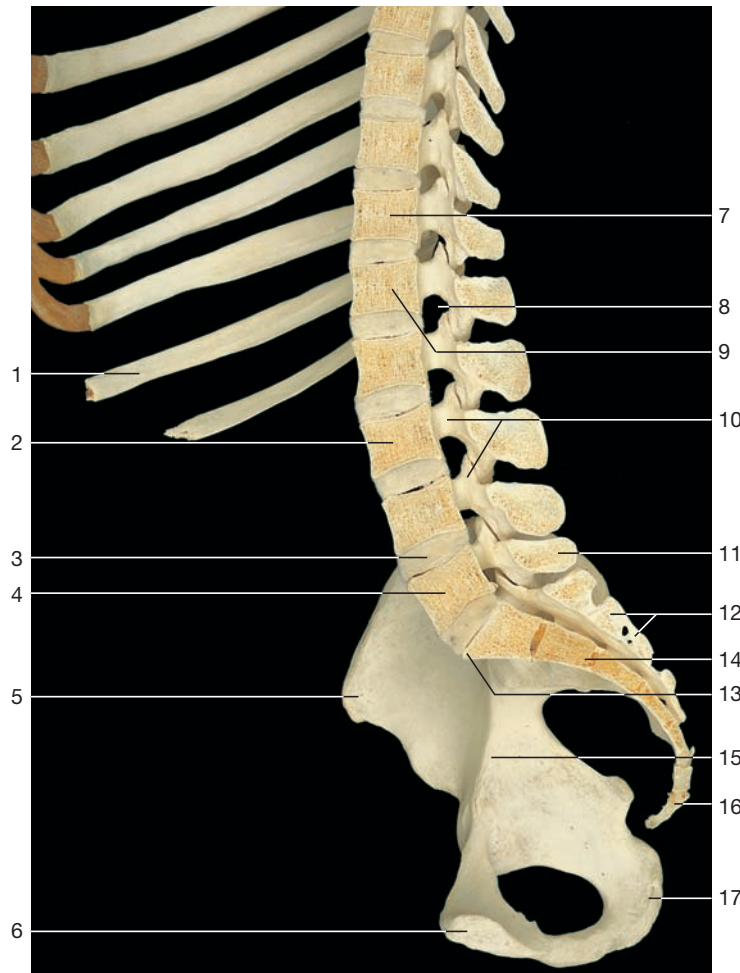
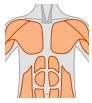


Spinal cord and lumbar plexus in situ (anterior aspect).



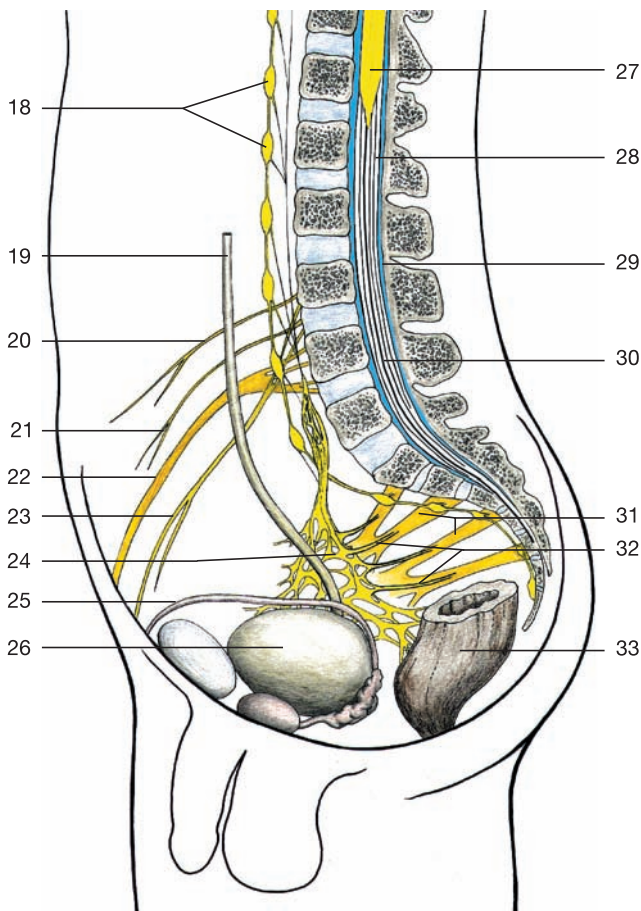
Organization of spinal cord segments in relation to the vertebral column (anterior aspect).
C = cervical; Th = thoracic; L = lumbar; S = sacral segments; Co = coccygeal bone. Numbers indicate the related vertebrae.

- | | |
|-------------------------|-----------------------------------|
| 1 Conus medullaris | 6 Genitofemoral nerve |
| 2 Filum terminale | 7 Lateral femoral cutaneous nerve |
| 3 Subcostal nerve | 8 Femoral nerve |
| 4 Iliohypogastric nerve | 9 Obturator nerve |
| 5 Ilio-inguinal nerve | |

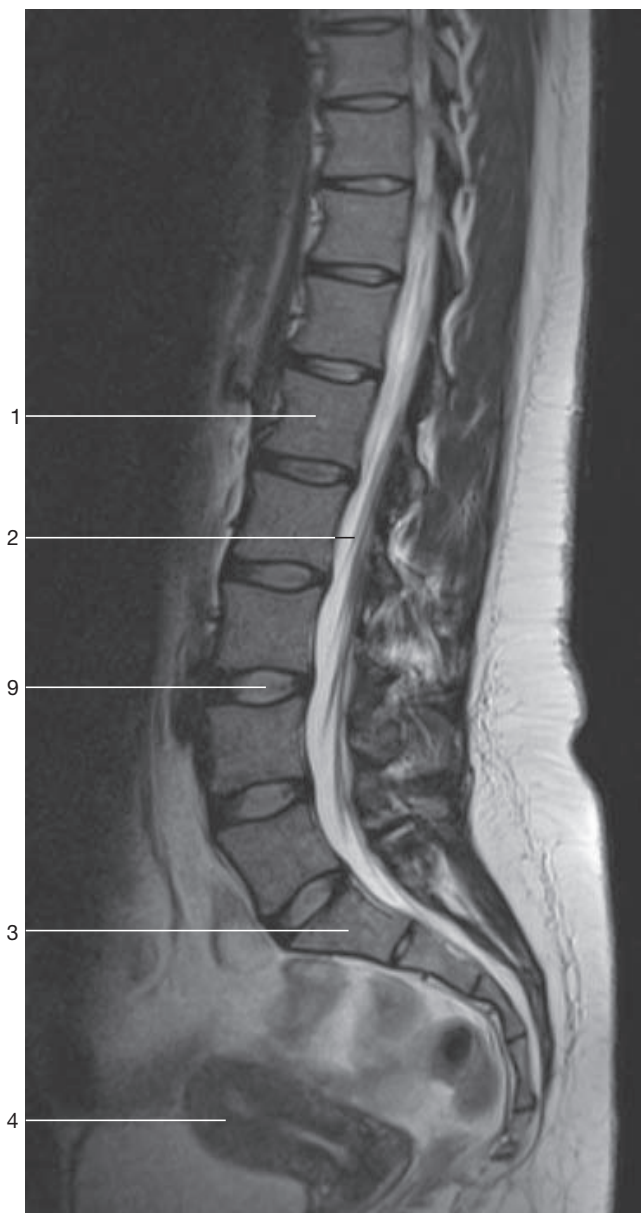


Lumbar part of vertebral column with pelvis and lower thoracic part (sagittal section, medial aspect).

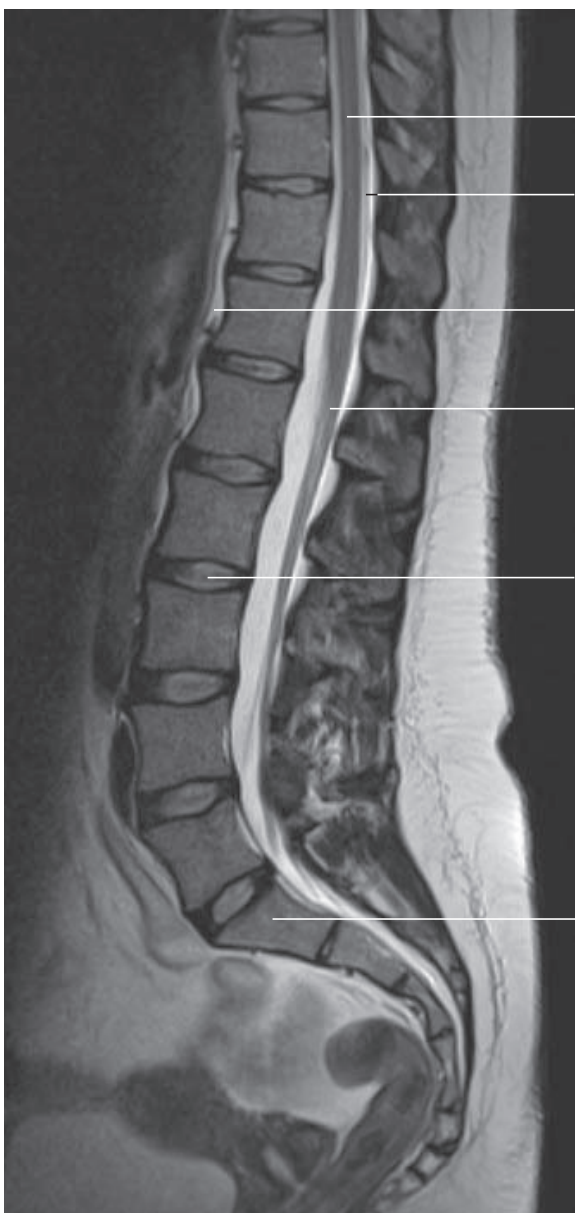
- 1 Eleventh rib
- 2 Body of third lumbar vertebra
- 3 Intervertebral disc
- 4 Body of fifth lumbar vertebra
- 5 Anterior superior iliac spine
- 6 Symphysial surface
- 7 Body of twelfth thoracic vertebra
- 8 Intervertebral foramen
- 9 Body of first lumbar vertebra
- 10 Vertebral canal
- 11 Spinous process of fifth lumbar vertebra
- 12 Sacrum (median sacral crest)
- 13 Promontory (promontorium)
- 14 Sacrum
- 15 Arcuate line
- 16 Coccyx
- 17 Ischial tuberosity
- 18 Sympathetic trunk with ganglia
- 19 Ureter
- 20 Iliohypogastric nerve (Th_{12} , L_1)
- 21 Ilio-inguinal nerve (L_1)
- 22 Femoral nerve (L_1-L_4)
- 23 Genitofemoral nerve (L_1 , L_2)
- 24 Inferior hypogastric plexus
- 25 Ductus deferens
- 26 Urinary bladder
- 27 Medullary cone of spinal cord
- 28 Root filaments of spinal nerves
- 29 Subarachnoid space (filled with cerebrospinal fluid) (blue)
- 30 Terminal filament of spinal cord
- 31 Sacral plexus
- 32 Pelvic splanchnic nerves (nervi erigentes)
- 33 Rectum



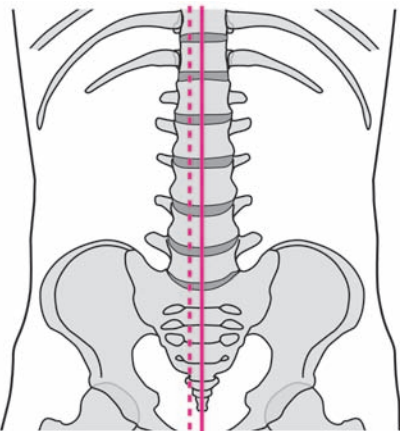
Lumbar part of vertebral column with spinal cord and root filaments (sagittal section). Note the high location of the medullary cone. Sacral plexus and inferior hypogastric plexus are schematically shown.



Paramedian section through the lumbar part of vertebral column with vertebral canal and spinal cord (dashed line in the schematic drawing; MRI scan).
(Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

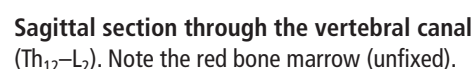
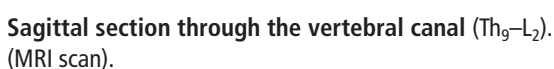
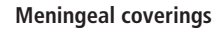
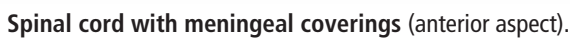
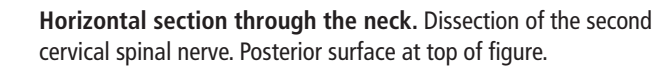


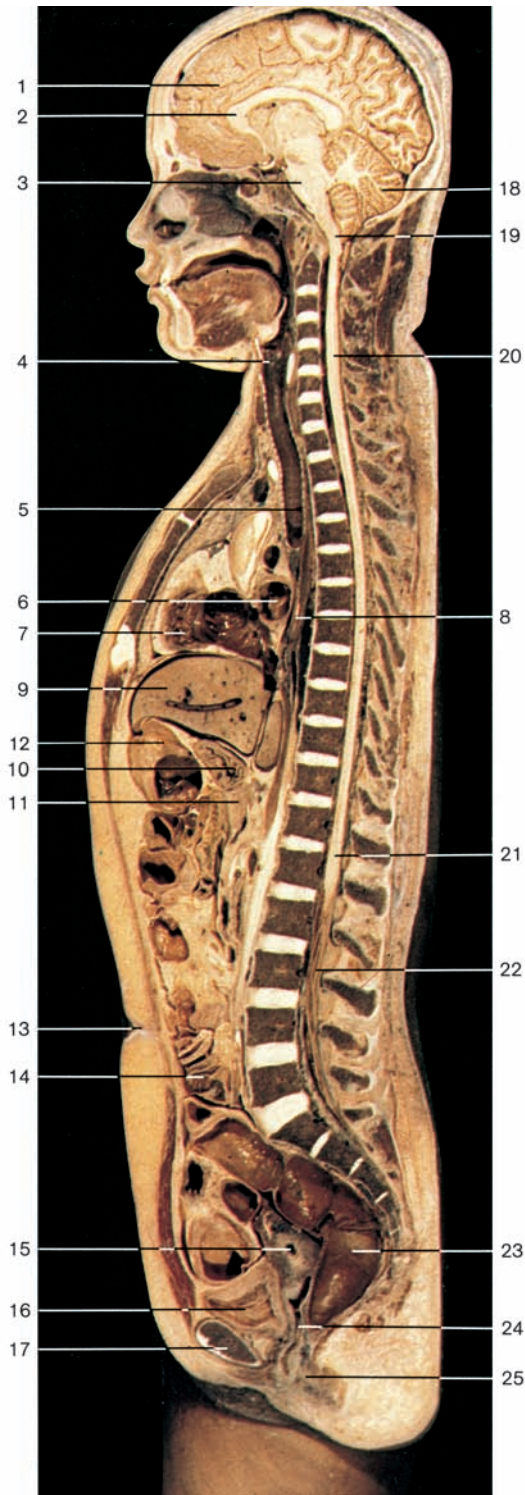
Median section through the lumbar part of vertebral column with vertebral canal and spinal cord (continuous line in the schematic drawing; MRI scan).
(Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



- 1 First lumbar vertebra (L₁)
- 2 Root filaments of spinal nerves
- 3 Sacrum
- 4 Uterus
- 5 Spinal cord
- 6 Dura mater of spinal cord
- 7 Anterior longitudinal ligament
- 8 Medullary cone of spinal cord
- 9 Intervertebral disc of lumbar vertebra

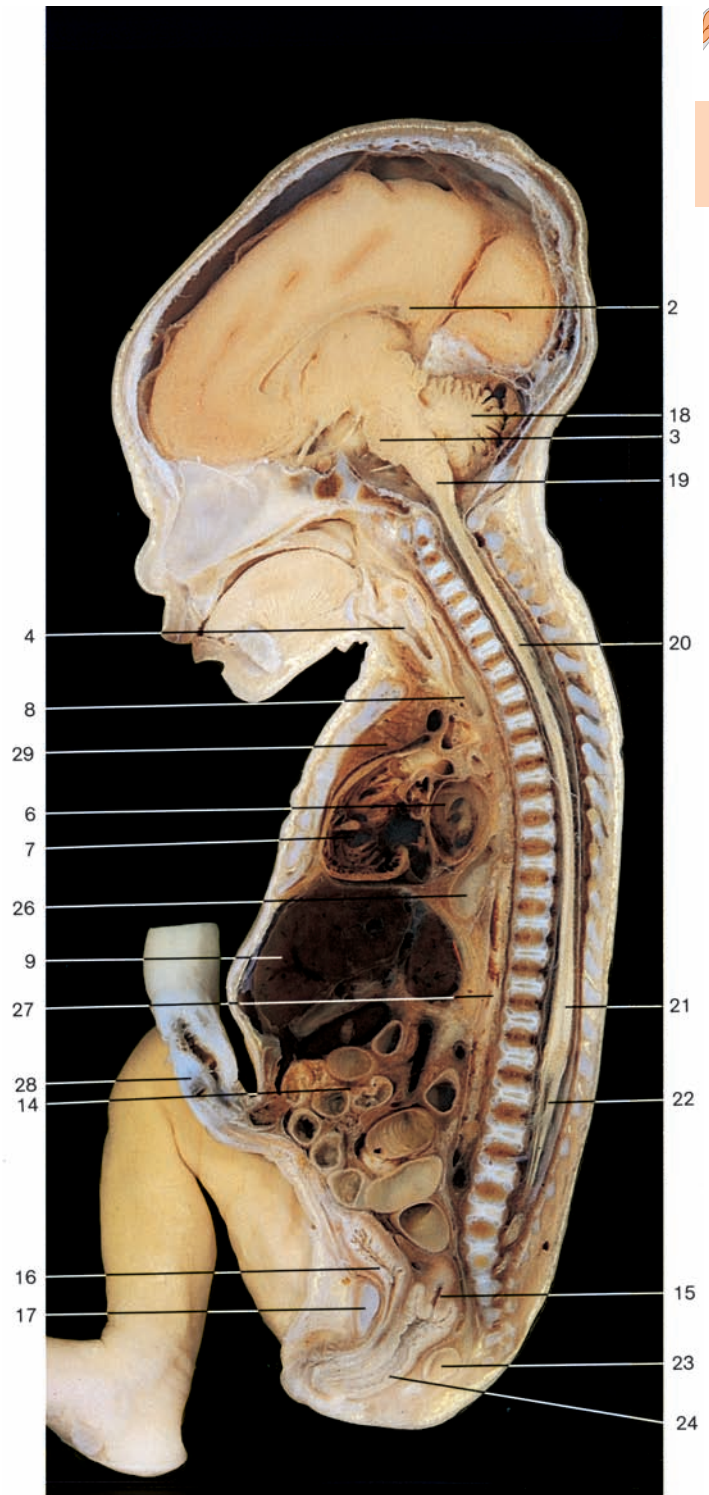
Localization of the sections (red lines).





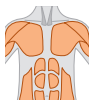
Median section through the head and trunk in the adult (female). The conus medullaris of the spinal cord is located at the level of L₁.

- | | |
|-------------------|----------------------|
| 1 Cerebrum | 11 Pancreas |
| 2 Corpus callosum | 12 Transverse colon |
| 3 Pons | 13 Umbilicus |
| 4 Larynx | 14 Small intestine |
| 5 Trachea | 15 Uterus |
| 6 Left atrium | 16 Urinary bladder |
| 7 Right ventricle | 17 Pubic symphysis |
| 8 Esophagus | 18 Cerebellum |
| 9 Liver | 19 Medulla oblongata |
| 10 Stomach | 20 Spinal cord |



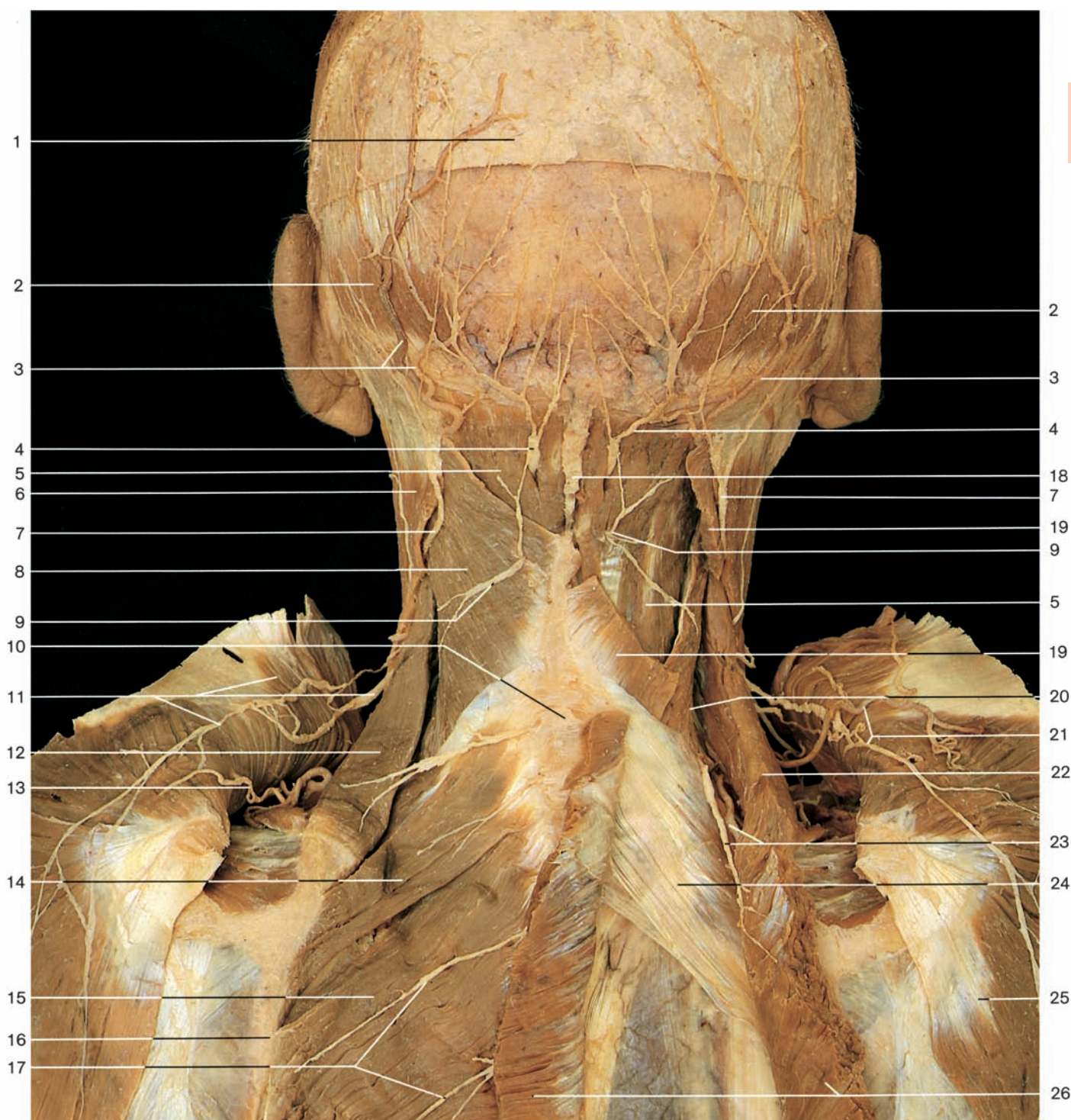
Median section through the head and trunk in the neonate. Note that in the neonate the conus medullaris of the spinal cord extends far more caudally than in the adult.

- | |
|-----------------------|
| 21 Conus medullaris |
| 22 Cauda equina |
| 23 Rectum |
| 24 Vagina |
| 25 Anus |
| 26 Inferior vena cava |
| 27 Aorta |
| 28 Umbilical cord |
| 29 Thymus |



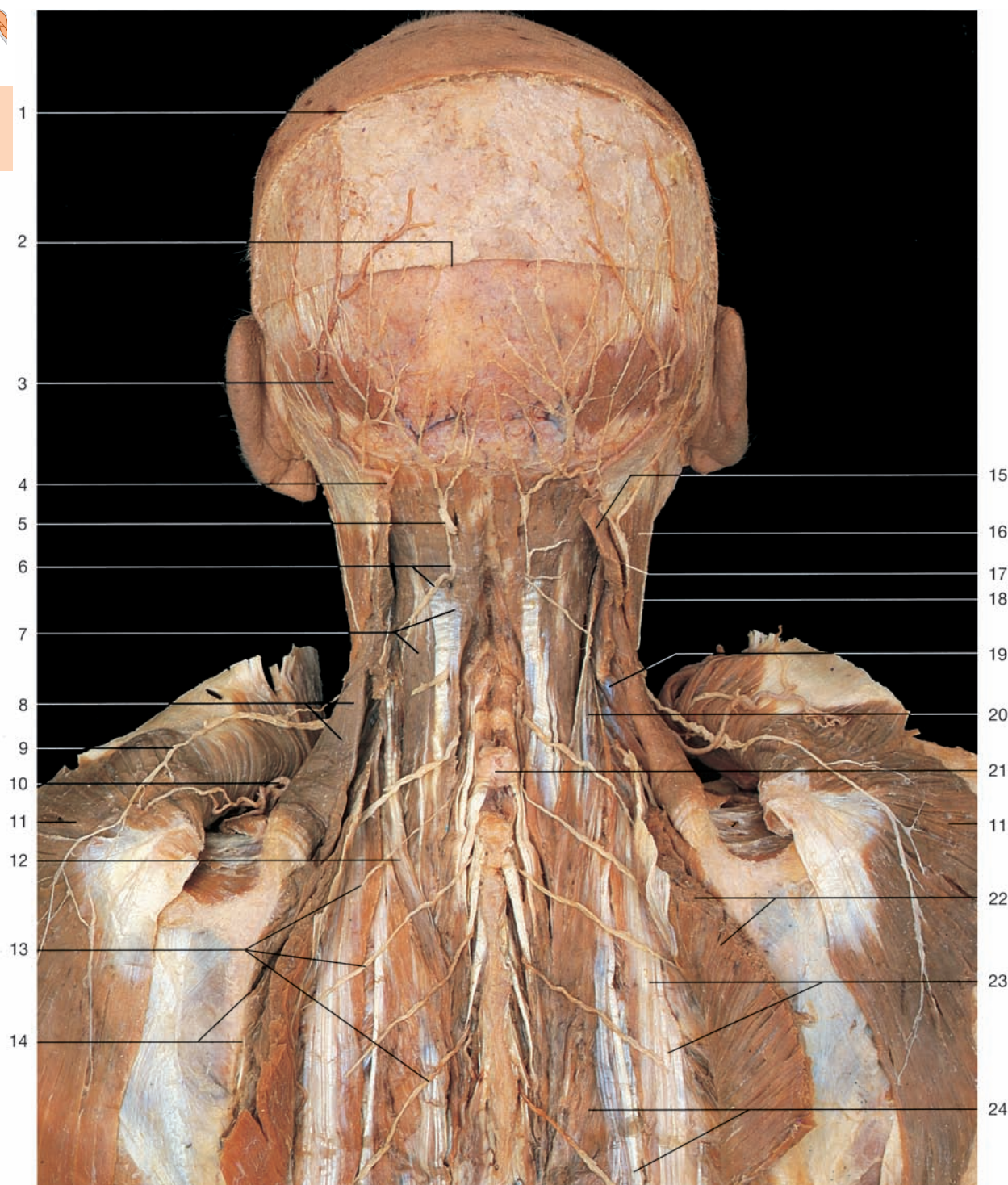
Posterior aspect of the neck (superficial layer). Dissection of the trapezius muscle and the cutaneous branches of the dorsal branches of spinal nerves.

- | | |
|---|--|
| 1 Sternocleidomastoid muscle | 10 Occipital belly of occipitofrontalis muscle |
| 2 Lesser occipital nerve | 11 Greater occipital nerve |
| 3 Descending fibers of trapezius muscle | 12 Third occipital nerve |
| 4 Spine of scapula | 13 Splenius capitis muscle |
| 5 Medial cutaneous branches of dorsal rami of spinal nerves | 14 Great auricular nerve |
| 6 Medial margin of scapula | 15 Cutaneous nerves of cervical plexus |
| 7 Rhomboid major muscle | 16 Transverse fibers of trapezius muscle |
| 8 Latissimus dorsi muscle | 17 Ascending fibers of trapezius muscle |
| 9 Galea aponeurotica | 18 Teres major muscle |



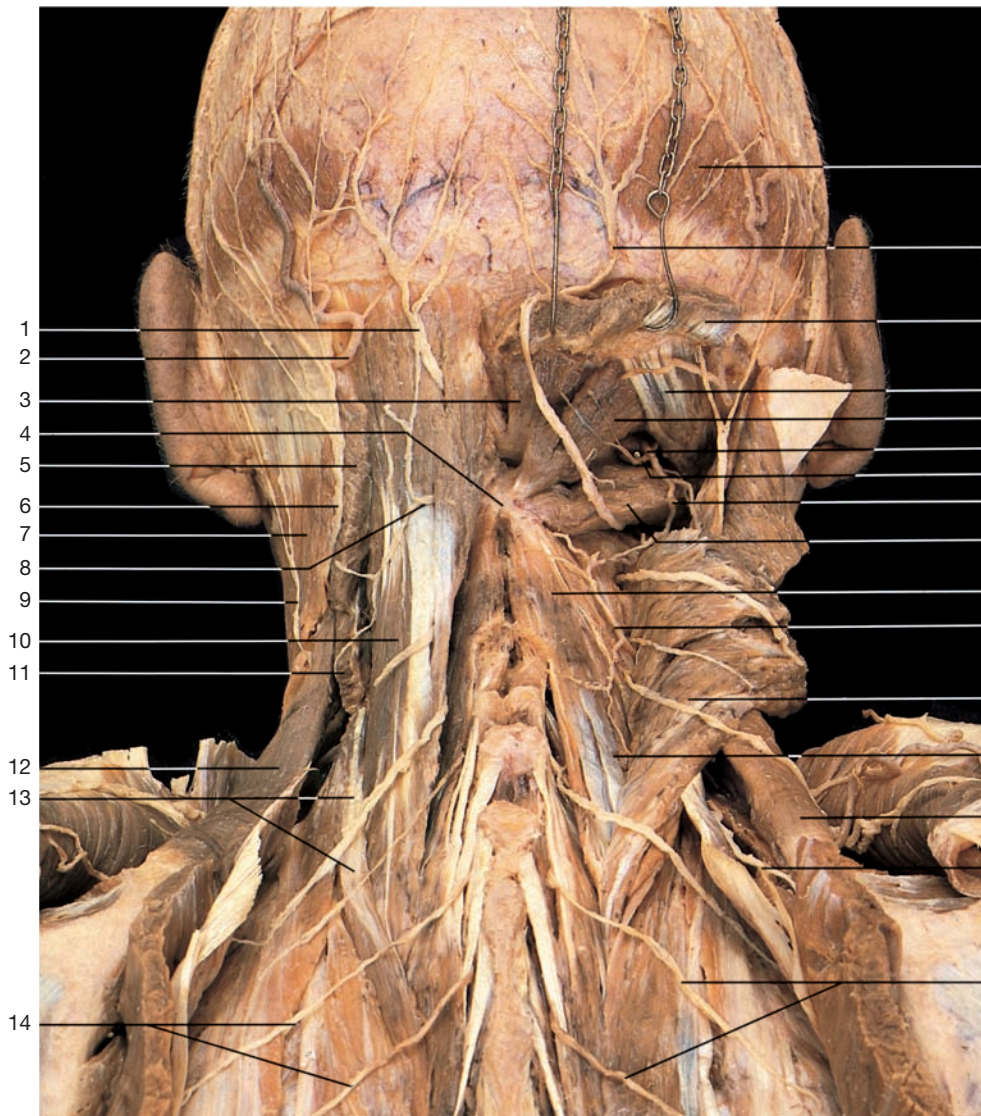
Posterior aspect of the neck (deeper layer). The left trapezius muscle has been divided and reflected. On the right, trapezius, rhomboid, and splenius muscles have been divided. The right levator scapulae muscle has been slightly reflected.

- | | | |
|--|---|---|
| 1 Galea aponeurotica | 11 Left trapezius muscle and accessory nerve | 20 Splenius cervicis muscle |
| 2 Occipital belly of occipitofrontalis muscle | 12 Levator scapulae muscle | 21 Right accessory nerve and superficial branch of transverse cervical artery |
| 3 Occipital artery | 13 Superficial branch of transverse cervical artery | 22 Right levator scapulae muscle |
| 4 Greater occipital nerve (C_2) | 14 Rhomboid minor muscle | 23 Dorsal scapular nerve and deep branch of transverse cervical artery |
| 5 Semispinalis capitis muscle | 15 Rhomboid major muscle | 24 Serratus posterior superior muscle |
| 6 Sternocleidomastoid muscle | 16 Medial margin of scapula | 25 Right trapezius muscle (divided and reflected) |
| 7 Lesser occipital nerve | 17 Medial branches of dorsal rami of spinal nerves | 26 Right rhomboid major muscle (divided and reflected) |
| 8 Left splenius capitis muscle | 18 Ligamentum nuchae | |
| 9 Third occipital nerve (C_3) | 19 Splenius capitis muscle (divided) | |
| 10 Spinous process of vertebra prominens (C_7) | | |

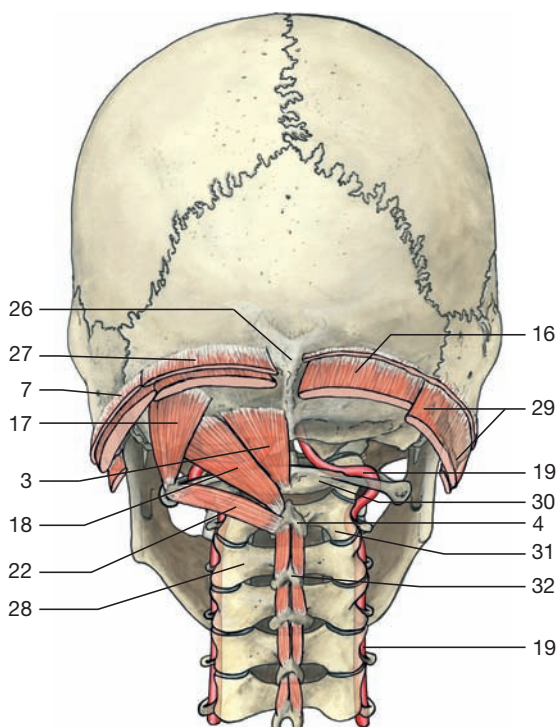


Posterior aspect of the neck (deepest layer). Trapezius, splenius capitis, and cervicis muscles have been divided and partly removed or reflected.

- | | | |
|---|--|--|
| 1 Skin of scalp | 9 Accessory nerve (n. XI) | 17 Lesser occipital nerve |
| 2 Galea aponeurotica | 10 Superficial cervical artery | 18 Great auricular nerve |
| 3 Occipital belly of occipitofrontalis muscle | 11 Trapezius muscle (reflected) | 19 Splenius cervicis muscle |
| 4 Occipital artery | 12 Longissimus cervicis muscle | 20 Longissimus cervicis muscle |
| 5 Greater occipital nerve | 13 Medial cutaneous branches of dorsal rami of spinal nerves | 21 Spinous process of vertebra prominens (C ₇) |
| 6 Third occipital nerve | 14 Medial margin of scapula | 22 Rhomboid muscles (divided) |
| 7 Semispinalis capitis muscle | 15 Splenius capitis muscle (divided) | 23 Iliocostalis thoracis muscle |
| 8 Levator scapulae muscle | 16 Sternocleidomastoid muscle | 24 Longissimus thoracis muscle |

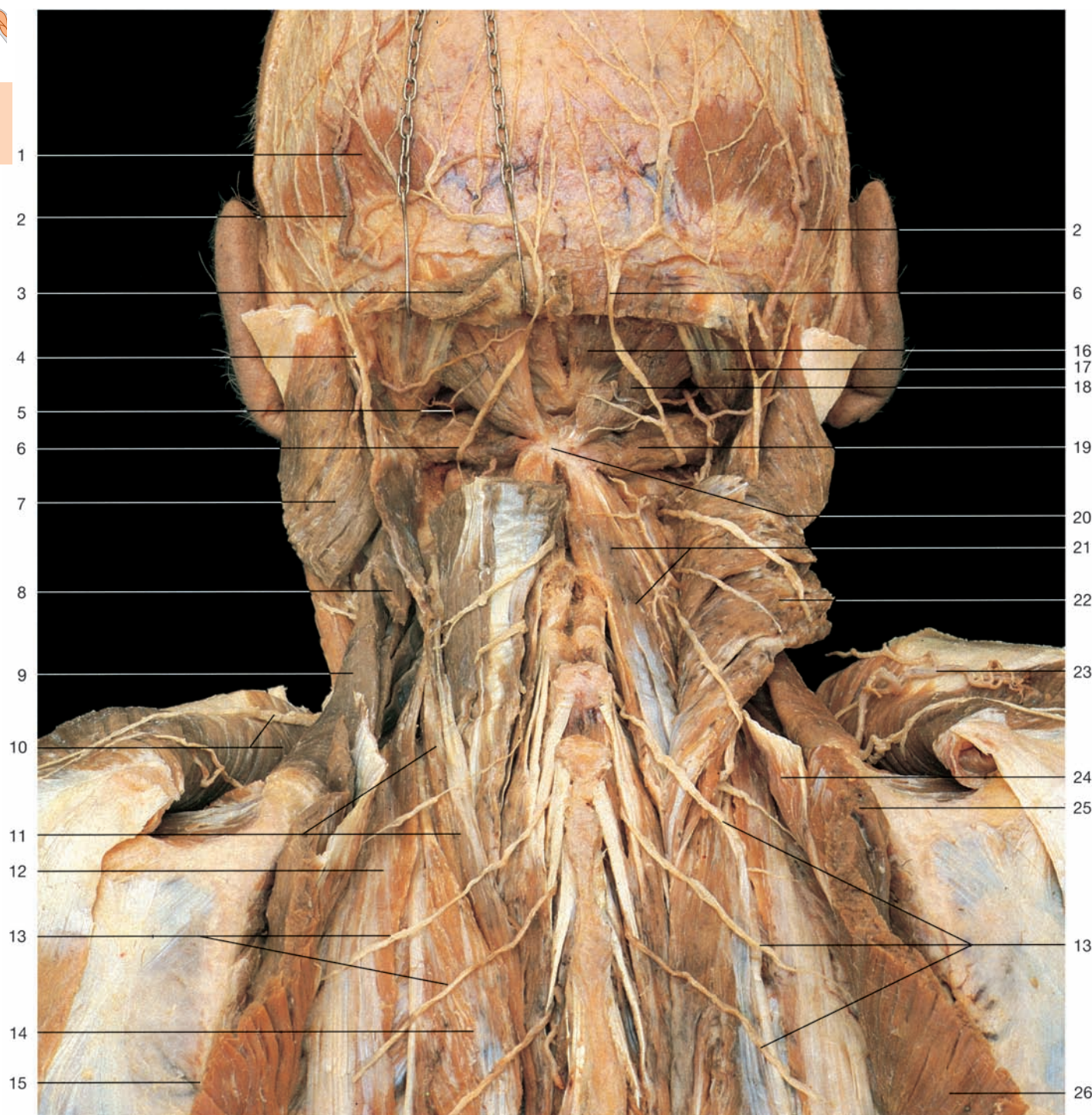


Posterior aspect of the neck (deepest layer). Dissection of suboccipital triangle. The right semispinalis capitis muscle has been divided and reflected.



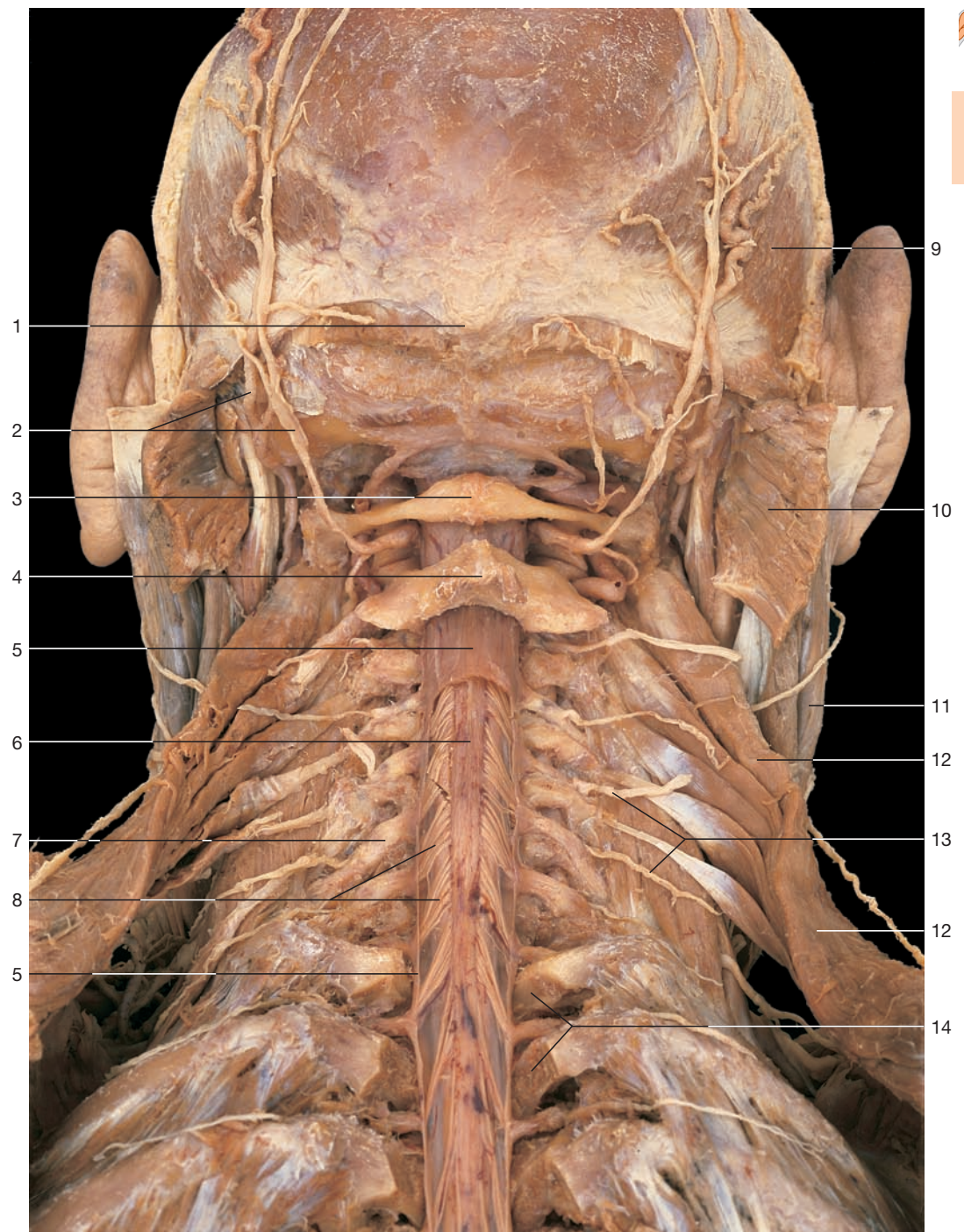
Suboccipital triangle and position of the vertebral artery.

- 1 Greater occipital nerve
- 2 Occipital artery
- 3 Rectus capitis posterior minor muscle
- 4 Spinous process of axis
- 5 Left splenius capitis muscle (cut)
- 6 Lesser occipital nerve
- 7 Left sternocleidomastoid muscle
- 8 Third occipital nerve (C₃)
- 9 Great auricular nerve
- 10 Left semispinalis capitis muscle
- 11 Left semispinalis cervicis muscle (cut)
- 12 Levator scapulae muscle
- 13 Left longissimus cervicis muscle
- 14 Medial branches of dorsal rami of spinal nerves
- 15 Occipital belly of occipitofrontalis muscle
- 16 Semispinalis capitis muscle (cut)
- 17 Obliquus capitis superior muscle
- 18 Rectus capitis posterior major muscle
- 19 Vertebral artery
- 20 Suboccipital nerve (C₁)
- 21 Muscular branch of vertebral artery
- 22 Obliquus capitis inferior muscle
- 23 Right semispinalis cervicis muscle
- 24 Deep cervical artery
- 25 Dorsal scapular nerve
- 26 External occipital protuberance
- 27 Trapezius muscle (cut)
- 28 Cervical vertebra (C₃)
- 29 Mastoid process and splenius capitis muscle
- 30 Atlas
- 31 Axis
- 32 Spinous process of third cervical vertebra



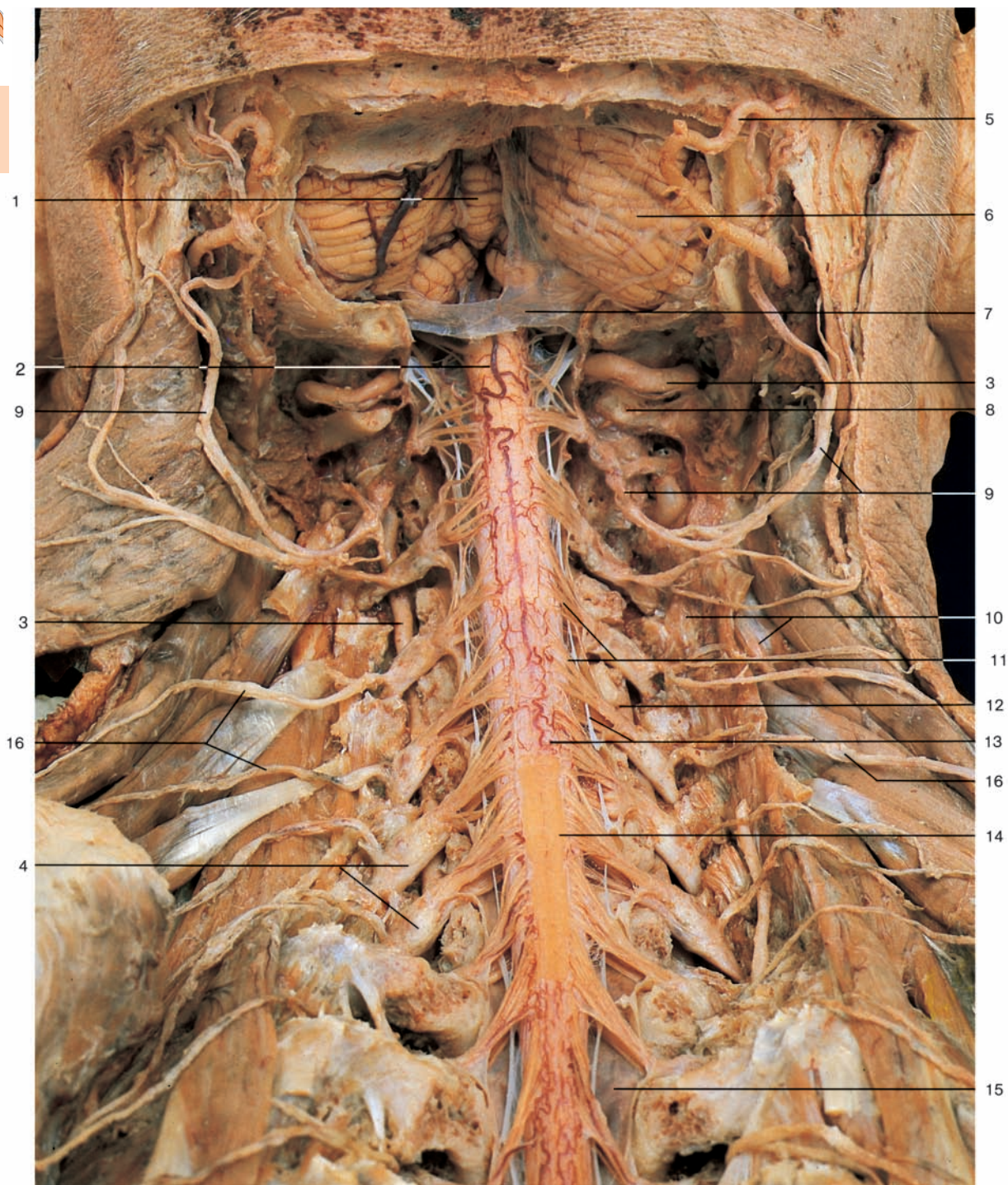
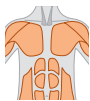
Posterior aspect of the neck (deepest layer). Dissection of suboccipital triangle on both sides.

- | | | |
|--|--|---|
| 1 Occipital belly of occipitofrontalis muscle | 11 Longissimus cervicis muscle | 21 Semispinalis cervicis muscle |
| 2 Occipital artery | 12 Iliocostalis cervicis muscle | 22 Semispinalis capitis muscle (divided and reflected) |
| 3 Insertion of semispinalis capitis muscle (divided) | 13 Medial cutaneous branches of dorsal rami of spinal nerves (C_7 , C_8) | 23 Transverse cervical artery (superficial branch) |
| 4 Lesser occipital nerve (from cervical plexus) | 14 Longissimus thoracis muscle | 24 Serratus posterior superior muscle (divided and reflected) |
| 5 Suboccipital nerve (C_1) | 15 Medial margin of scapula | 25 Rhomboid minor muscle (divided and reflected) |
| 6 Greater occipital nerve (C_2) | 16 Rectus capitis posterior minor muscle | 26 Rhomboid major muscle (divided and reflected) |
| 7 Splenius capitis muscle (reflected) | 17 Obliquus capitis superior muscle | |
| 8 Splenius cervicis muscle | 18 Rectus capitis posterior major muscle | |
| 9 Levator scapulae muscle | 19 Obliquus capitis inferior muscle | |
| 10 Accessory nerve (n. XI) and trapezius muscle | 20 Spinous process of axis | |



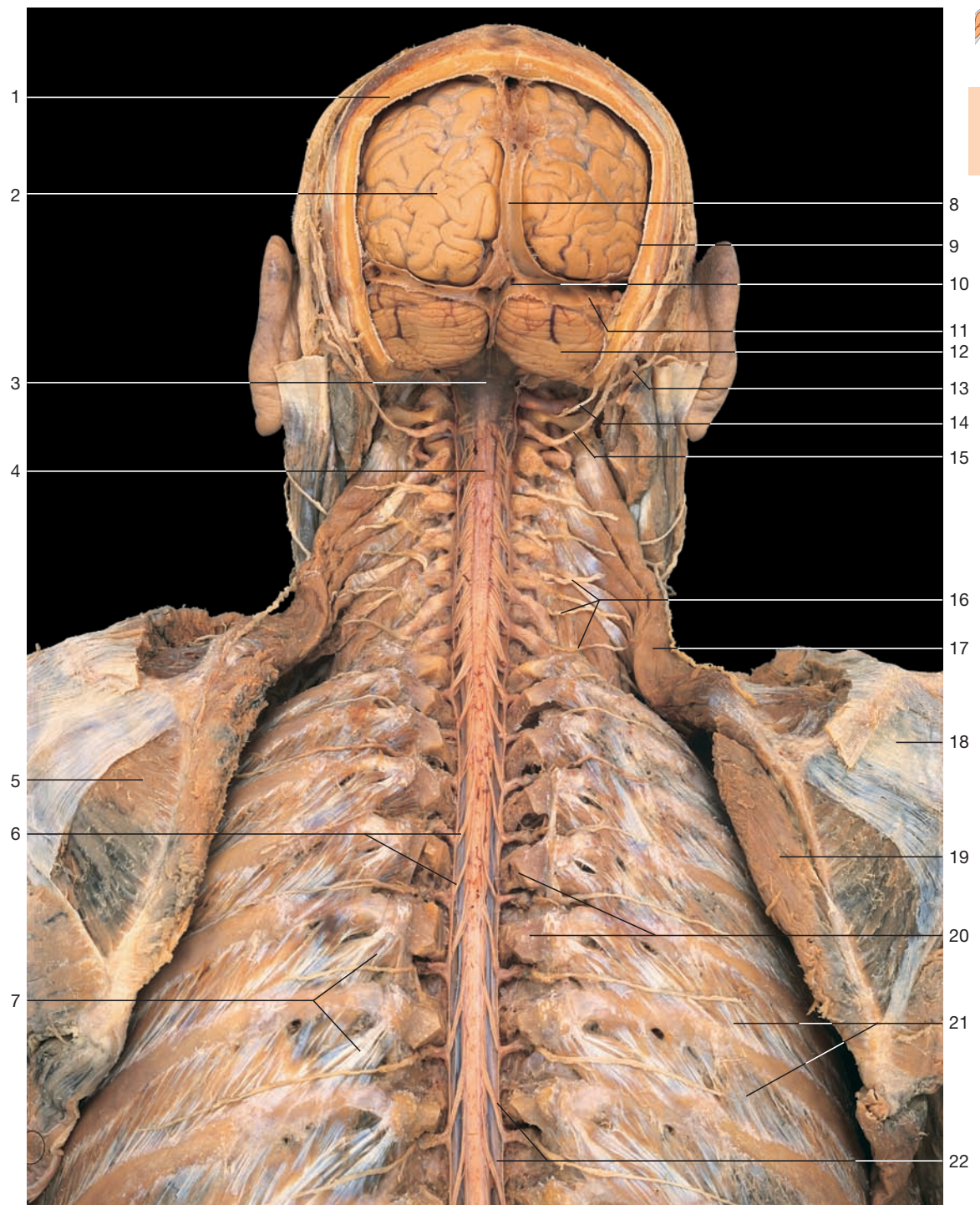
Posterior aspect of the neck (deepest layer). The vertebral canal caudally of the atlas and axis has been opened to show the spinal cord. The dura mater has been partly removed.

- | | |
|--|---|
| 1 External occipital protuberance | 8 Posterior root filaments (fila radicularia posterior) |
| 2 Greater occipital nerve (C_2) and occipital artery | 9 Occipital belly of occipitofrontalis muscle |
| 3 Atlas (posterior arch) | 10 Splenius capitis muscle (cut and reflected) |
| 4 Axis (posterior arch) | 11 Sternocleidomastoid muscle |
| 5 Spinal dura mater | 12 Levator scapulae muscle |
| 6 Spinal cord | 13 Posterior branches of spinal nerves |
| 7 Spinal ganglion | 14 Arches of cervical vertebrae (cut) |



Posterior aspect of the neck (deepest layer). Dissection of medulla oblongata and spinal cord. The cranial cavity has been opened.

- | | |
|---|---|
| 1 Vermis of the cerebellum | 9 Greater occipital nerve (C_2) |
| 2 Medulla oblongata and posterior spinal artery | 10 Levator scapulae muscle and intertransverse ligament |
| 3 Vertebral artery | 11 Dorsal roots of spinal nerves |
| 4 Spinal ganglion | 12 Vertebral arch |
| 5 Occipital artery | 13 Denticulate ligament and arachnoid mater |
| 6 Cerebellum | 14 Area where pia mater has been removed |
| 7 Cerebellomedullary cistern | 15 Spinal dura mater |
| 8 Posterior arch of atlas | 16 Dorsal rami of spinal nerves |



Posterior aspect of the neck (deepest layer). Dissection of medulla oblongata and spinal cord in relation to the brain.

- | | |
|---|--|
| 1 Calvaria | 12 Cerebellum |
| 2 Left hemisphere of the brain | 13 Occipital artery |
| 3 Cerebellomedullary cistern | 14 Suboccipital nerve (C_1) |
| 4 Spinal cord | 15 Greater occipital nerve (C_2) |
| 5 Scapula with infraspinous muscle | 16 Posterior branches of spinal nerves |
| 6 Posterior root filaments (fila radicularia posterior) | 17 Levator scapulae muscle |
| 7 Levatores costarum muscles | 18 Deltoid muscle |
| 8 Falx cerebri with sinus sagittalis superior | 19 Rhomboid muscles |
| 9 Subarachnoidal space | 20 Vertebral arches (cut) |
| 10 Confluens sinuum | 21 External intercostal muscles |
| 11 Transverse sinus | 22 Spinal dura mater |



Oblique-lateral aspect of the neck (deeper layer). The trapezius muscle has been removed.

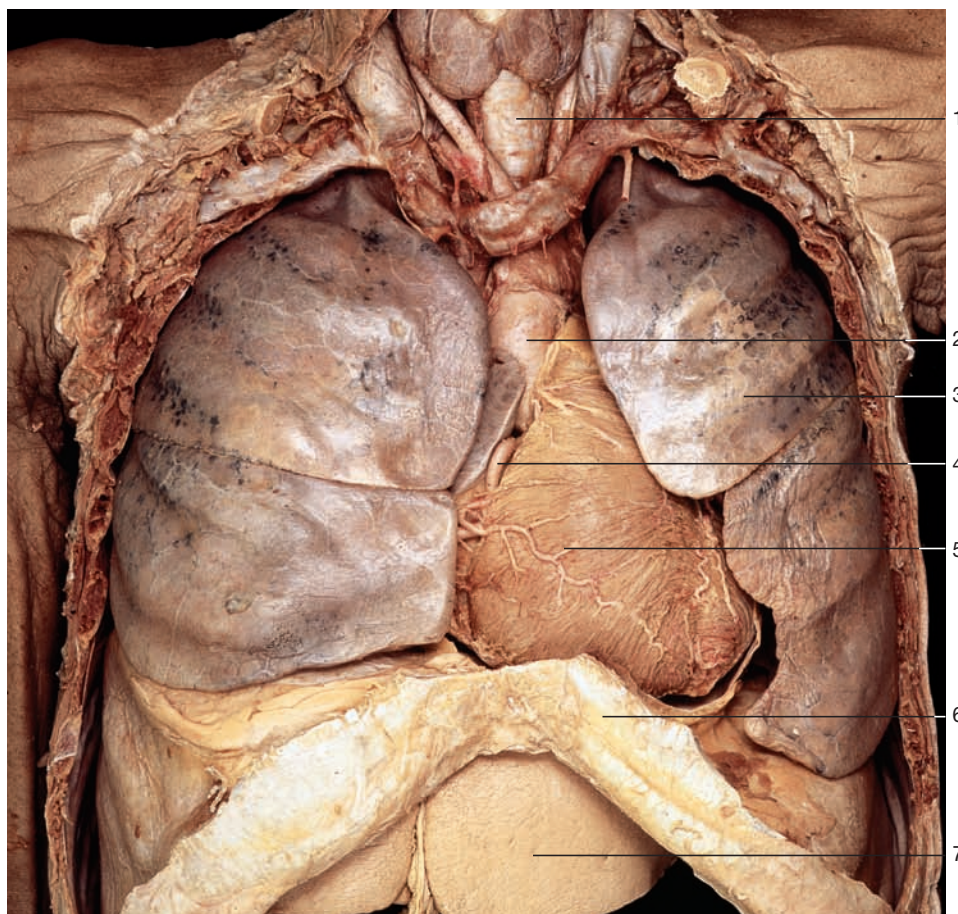
- | | |
|--|--|
| 1 External occipital protuberance | 15 Greater occipital nerve (C ₂) |
| 2 Semispinalis capitis muscle | 16 Lesser occipital nerve |
| 3 Splenius capitis muscle | 17 Sternocleidomastoid muscle |
| 4 Scapula | 18 Great auricular nerve |
| 5 Splenius cervicis muscle | 19 Punctum nervosum |
| 6 Posterior branches of spinal nerves | 20 Transverse cervical nerve |
| 7 Longissimus muscle | 21 Supraclavicular nerves |
| 8 Spinous processes of thoracic vertebrae | 22 Accessory nerve (n. XI) |
| 9 Iliocostalis muscle | 23 Trapezius muscle (cut edge) |
| 10 Latissimus dorsi muscle | 24 Medial margin of scapula |
| 11 Epidermis of the head (scalp) | 25 Rhomboid major muscle |
| 12 Galea aponeurotica | 26 Infrapinnous muscle |
| 13 Occipital belly of occipitofrontalis muscle | 27 Teres major muscle |
| 14 Occipital artery | |

4 Thoracic Organs



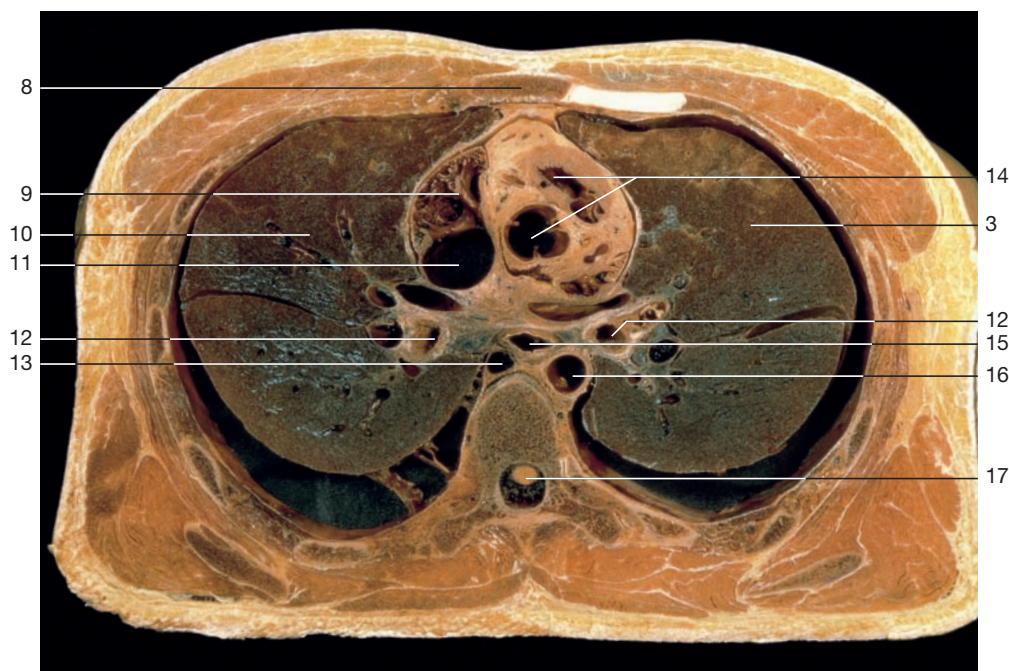
Position of the Thoracic Organs _____	252
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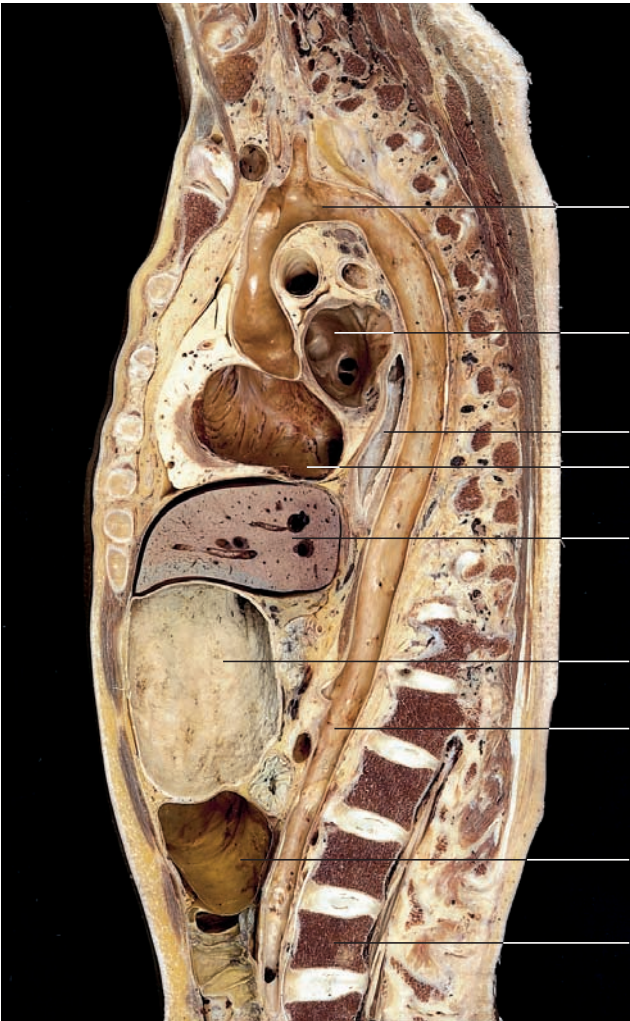


- 1 Trachea
- 2 Ascending aorta
- 3 Upper lobe of left lung
- 4 Right coronary artery
- 5 Right ventricle of the heart
- 6 Costal margin
- 7 Liver
- 8 Sternum
- 9 Right auricle of the heart
- 10 Middle lobe of right lung
- 11 Right atrium of the heart
- 12 Main bronchus
- 13 Azygos vein
- 14 Left ventricle of the heart and bulb of aorta
- 15 Esophagus
- 16 Descending aorta
- 17 Spinal cord

Thoracic organs in situ (anterior aspect). The anterior thoracic wall has been removed.

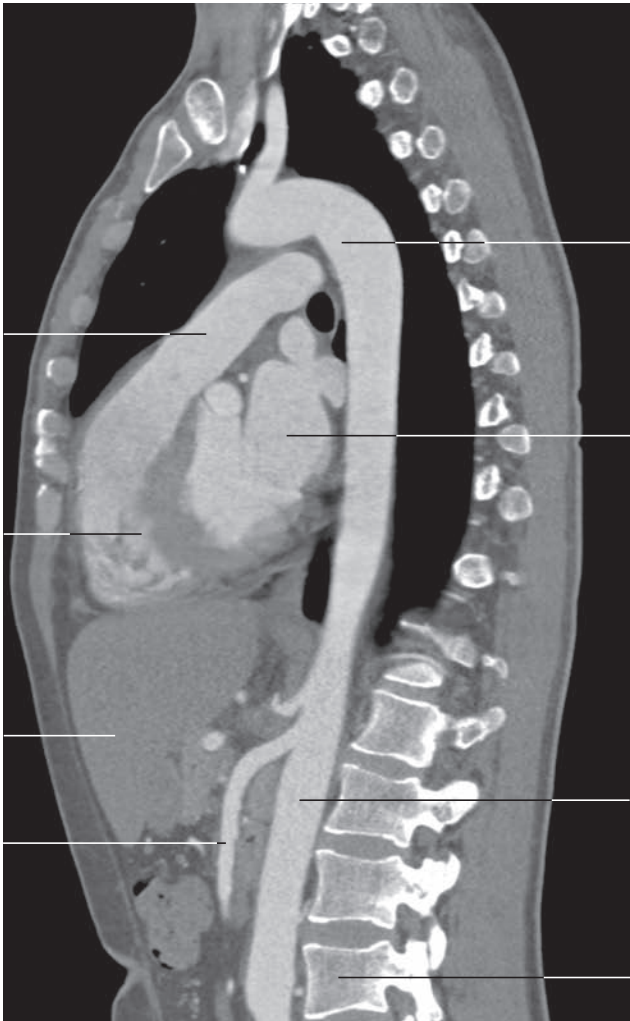


Horizontal section through the thorax at the level of the seventh thoracic vertebra (from below).



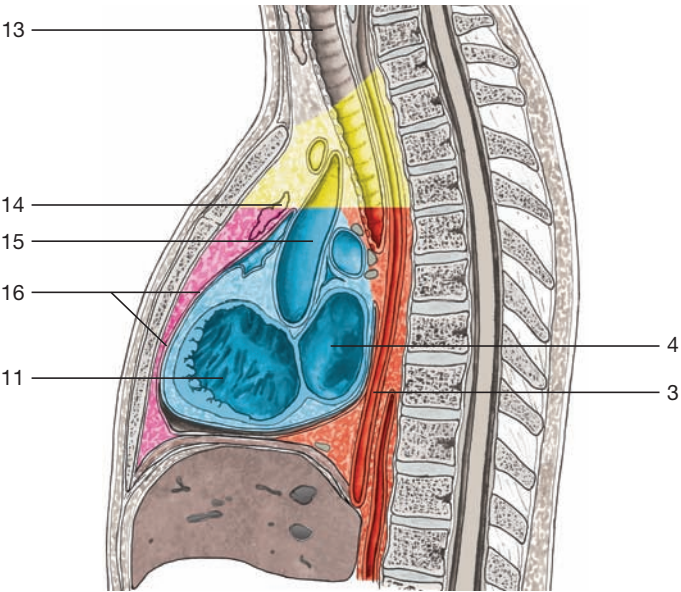
Sagittal section through the thoracic and abdominal cavities.

- 1 Aortic arch
- 2 Left atrium of the heart
- 3 Esophagus
- 4 Right atrium of the heart
- 5 Liver
- 6 Stomach
- 7 Abdominal aorta
- 8 Transverse colon (dilated)
- 9 Body of lumbar vertebra



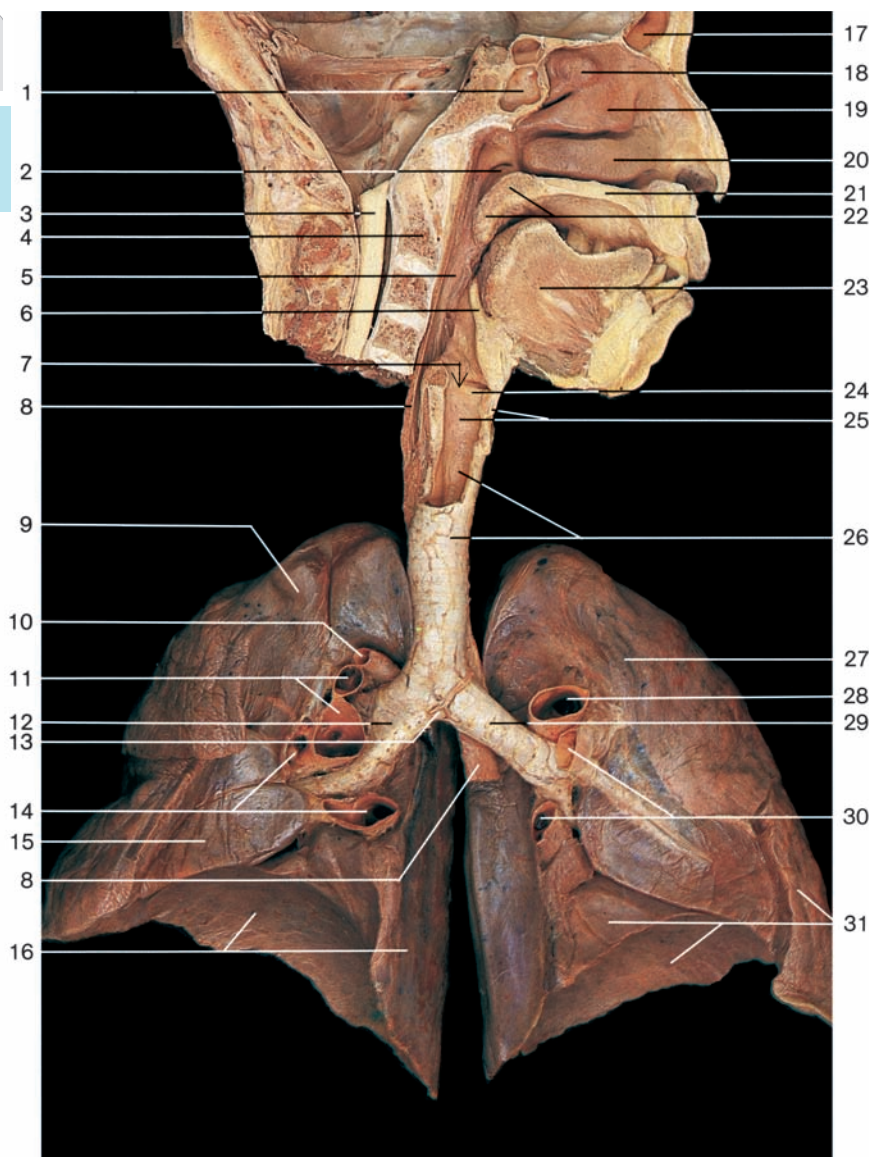
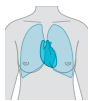
Sagittal section through the thoracic and abdominal cavities (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg.)

- 10 Pulmonary trunk
- 11 Right ventricle of the heart
- 12 Superior mesenteric artery
- 13 Trachea
- 14 Remaining parts of thymus gland
- 15 Ascending aorta
- 16 Pericardium



Sagittal section through the thoracic cavity. The parts of the mediastinum are indicated by colors (compare with the table).

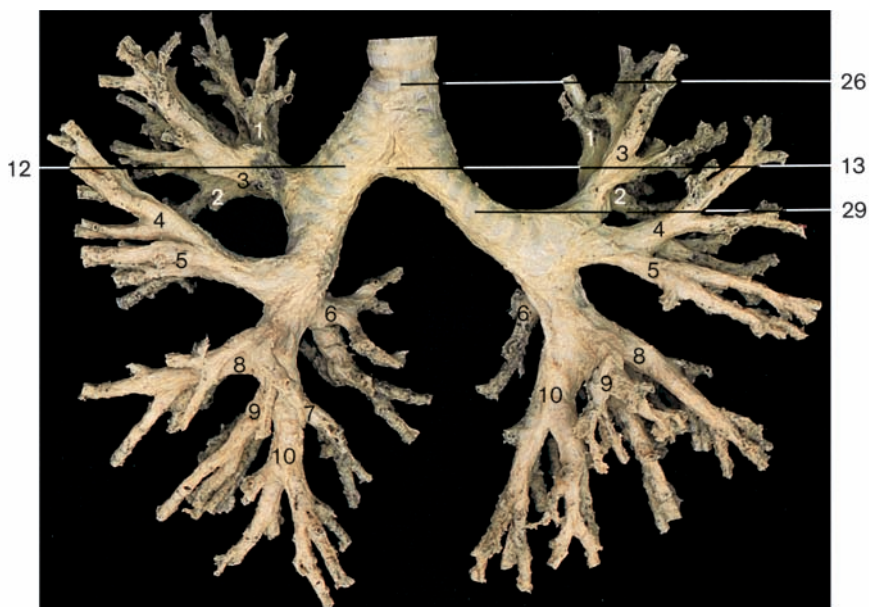
Parts of mediastinum	Content
Superior mediastinum (yellow)	Trachea, brachiocephalic veins, thymus, aortic arch, esophagus, thoracic duct
Middle mediastinum (blue)	Heart, ascending aorta, pulmonary trunk, pulmonary veins, phrenic nerves
Posterior mediastinum (orange)	Esophagus with vagus nerves, descending aorta, thoracic duct, sympathetic trunks
Anterior mediastinum (pink)	Smaller vessels and nerves, fat and connective tissue, thymus (only in the child)



- 1 Sphenoid sinus
- 2 Pharyngeal opening of auditory tube
- 3 Spinal cord
- 4 Dens of axis
- 5 Oropharynx (oropharyngeal isthmus)
- 6 Epiglottis
- 7 Entrance of larynx
- 8 Esophagus
- 9 Upper lobe of right lung
- 10 Azygos vein
- 11 Branches of pulmonary artery
- 12 Right main bronchus
- 13 Bifurcation of trachea
- 14 Tributaries of right pulmonary veins
- 15 Middle lobe of right lung
- 16 Lower lobe of right lung
- 17 Frontal sinus
- 18 Superior nasal concha
- 19 Middle nasal concha
- 20 Inferior nasal concha
- 21 Hard palate
- 22 Soft palate with uvula
- 23 Tongue
- 24 Vocal fold
- 25 Larynx
- 26 Trachea
- 27 Upper lobe of left lung
- 28 Left pulmonary artery
- 29 Left main bronchus
- 30 Left pulmonary veins
- 31 Lower lobe of left lung

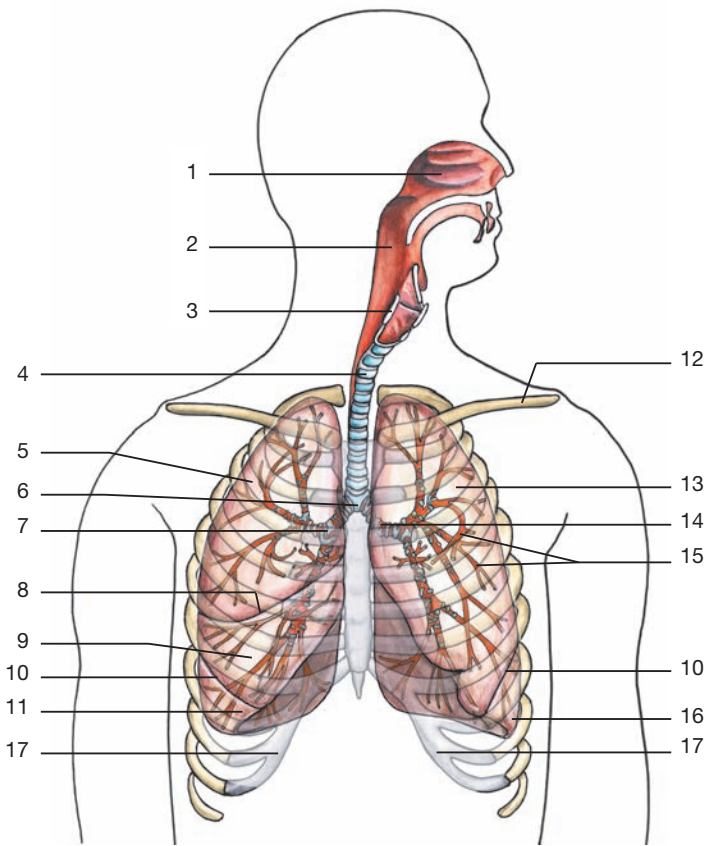
Respiratory system. The lungs have been fixed in expiration and turned laterally. Head bisected and turned laterally.

▷ To page 255:

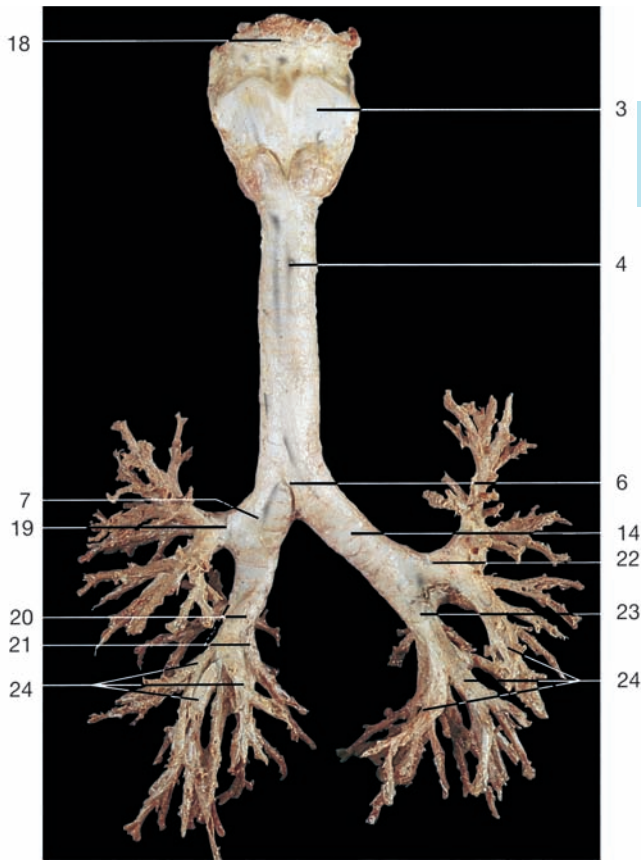


Bronchial tree (anterior aspect). The lung tissue has been removed. The bronchopulmonary segments are numbered 1–10.

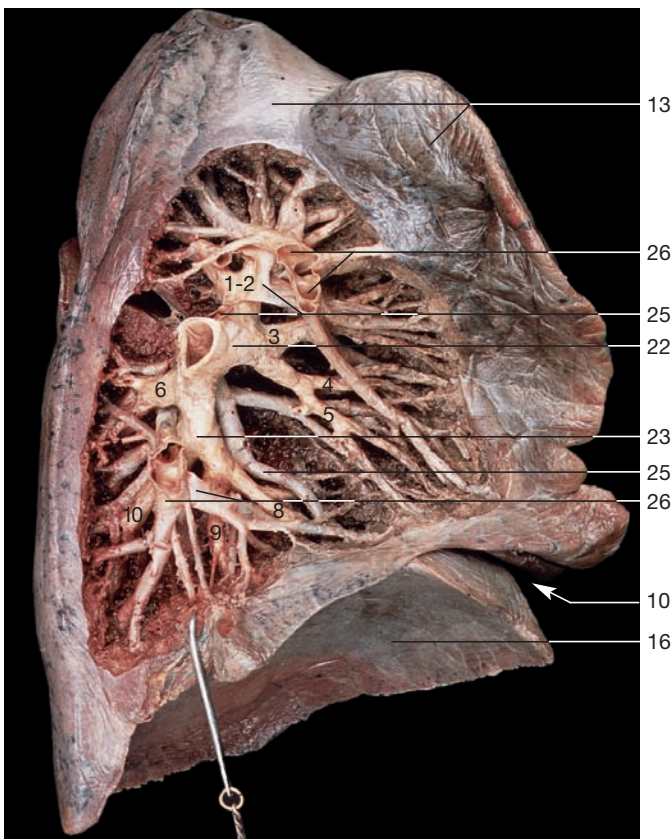
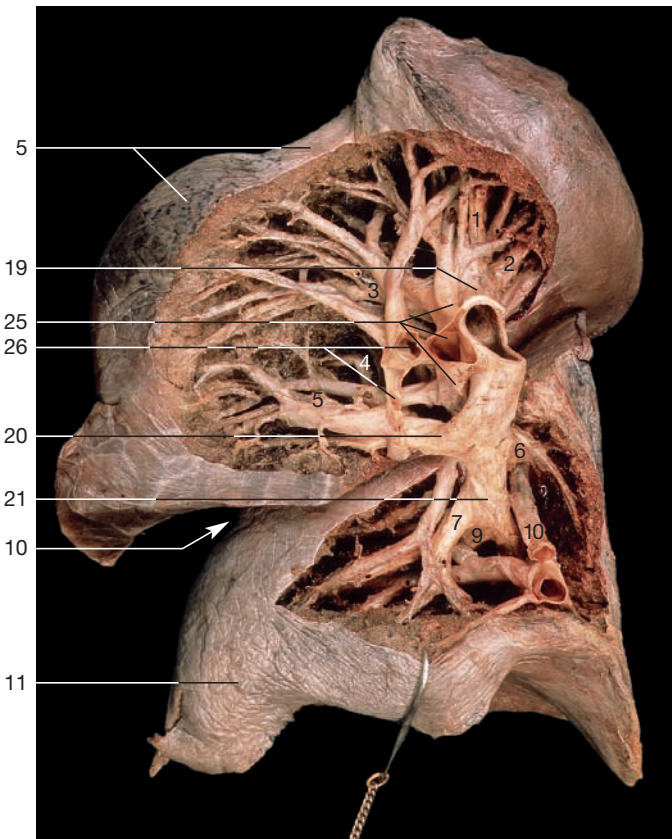
- 1 Nasal cavity
- 2 Pharynx
- 3 Larynx (thyroid cartilage)
- 4 Trachea
- 5 Upper lobe of right lung
- 6 Bifurcation of trachea
- 7 Right main bronchus
- 8 Horizontal fissure of right lung
- 9 Middle lobe of right lung
- 10 Oblique fissures of lungs
- 11 Lower lobe of right lung
- 12 Clavicle
- 13 Upper lobe of left lung
- 14 Left main bronchus
- 15 Bronchi supplying bronchopulmonary segments
- 16 Lower lobe of left lung
- 17 Costal margin
- 18 Hyoid bone
- 19 Right superior lobe bronchus
- 20 Right middle lobe bronchus
- 21 Right inferior lobe bronchus
- 22 Left superior lobe bronchus
- 23 Left inferior lobe bronchus
- 24 Segmental bronchi
- 25 Branches of pulmonary arteries
- 26 Branches of pulmonary veins



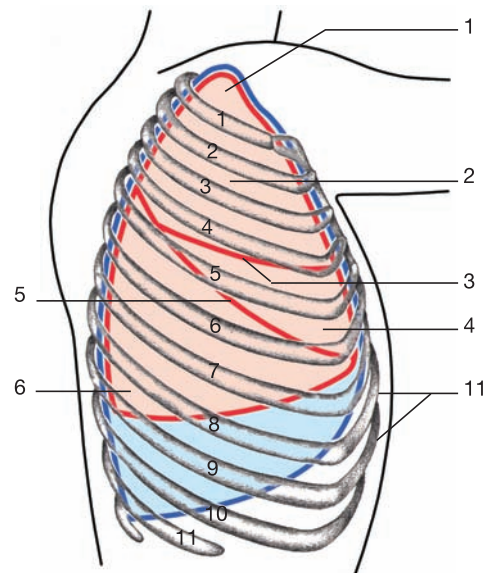
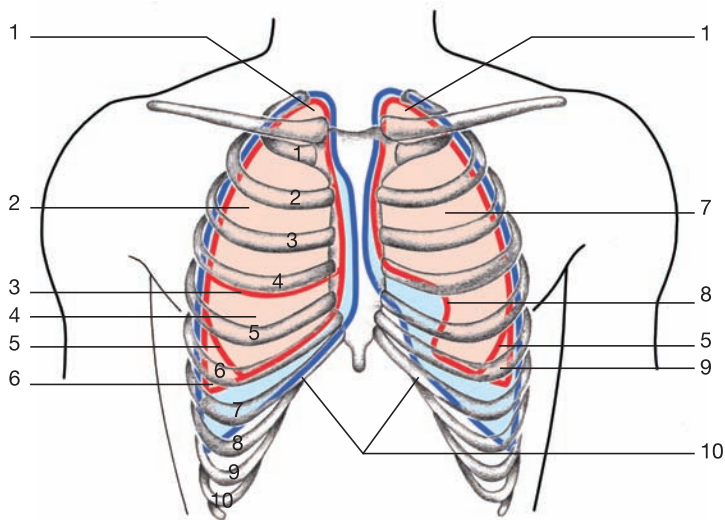
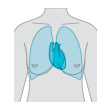
Organization and positions of the respiratory organs (anterior aspect).



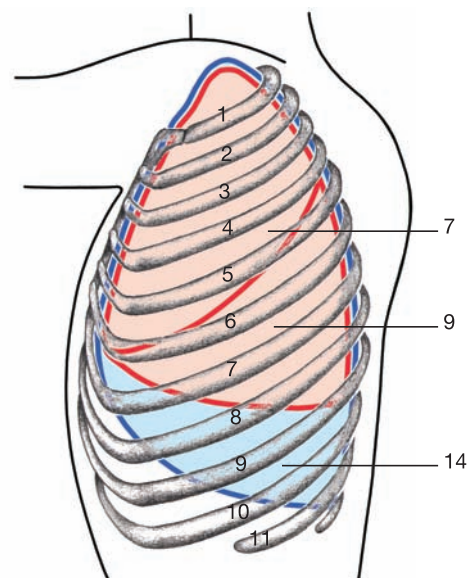
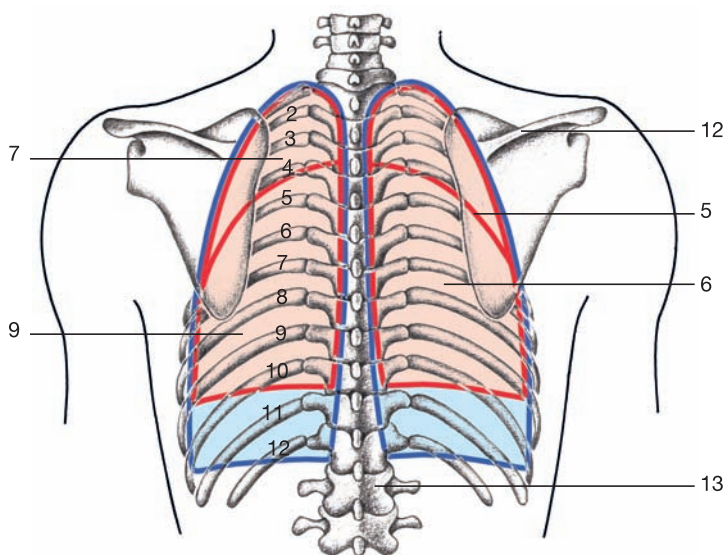
Larynx, trachea, and bronchial tree (anterior aspect).



Mediastinal dissection of the bronchial tree, pulmonary veins, and pulmonary arteries of right lung (left) and left lung (right) (medial aspect). The bronchopulmonary segments are numbered 1–10.



Surface projections of lungs and pleura on the thoracic wall. Left: anterior aspect; right: right-lateral aspect. Red = margins of the lung; blue = margins of pleura. The numbers indicate the ribs.



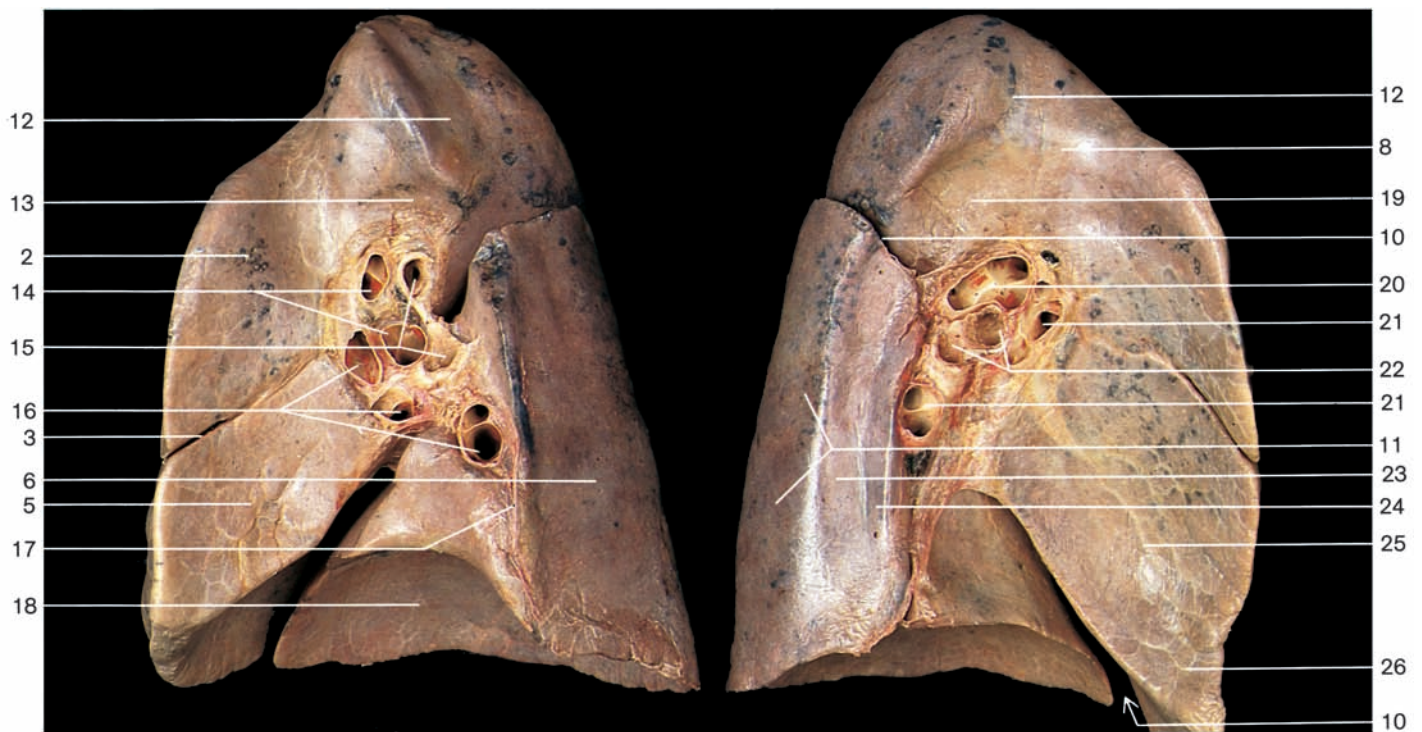
Surface projections of lungs and pleura on the thoracic wall. Left: posterior aspect; right: left-lateral aspect. Red = margins of lung; blue = margins of pleura. The numbers indicate the ribs.

- | | | |
|------------------------------------|------------------------------|--|
| 1 Apex of lung | 6 Lower lobe of right lung | 11 Costal margin |
| 2 Upper lobe of right lung | 7 Upper lobe of left lung | 12 Spine of scapula |
| 3 Horizontal fissure of right lung | 8 Cardiac notch of left lung | 13 First lumbar vertebra |
| 4 Middle lobe of right lung | 9 Lower lobe of left lung | 14 Space between border of lung and pleura (costodiaphragmatic recess) |
| 5 Oblique fissures of lungs | 10 Infraclavicular angle | |



Right lung (lateral aspect).

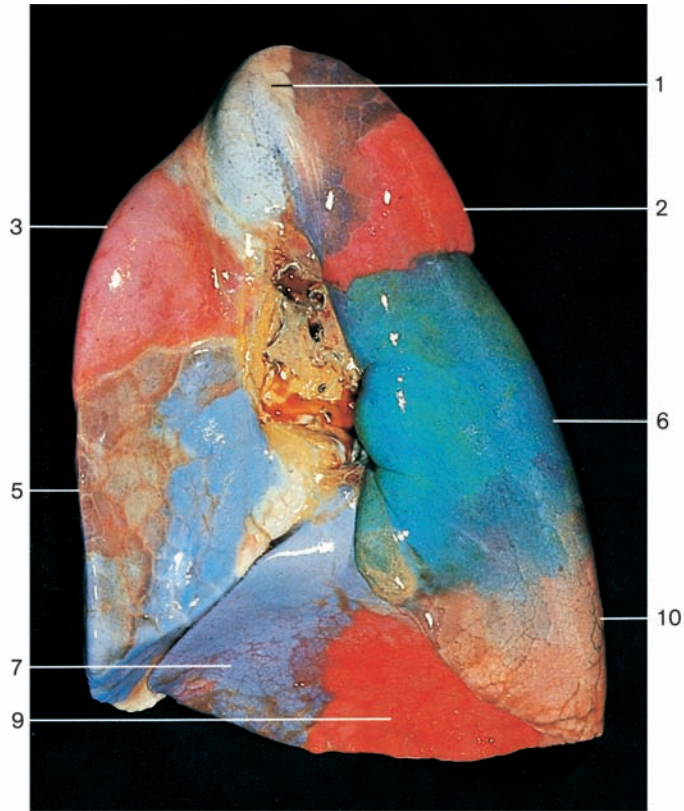
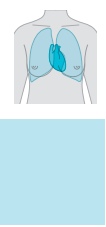
Left lung (lateral aspect).



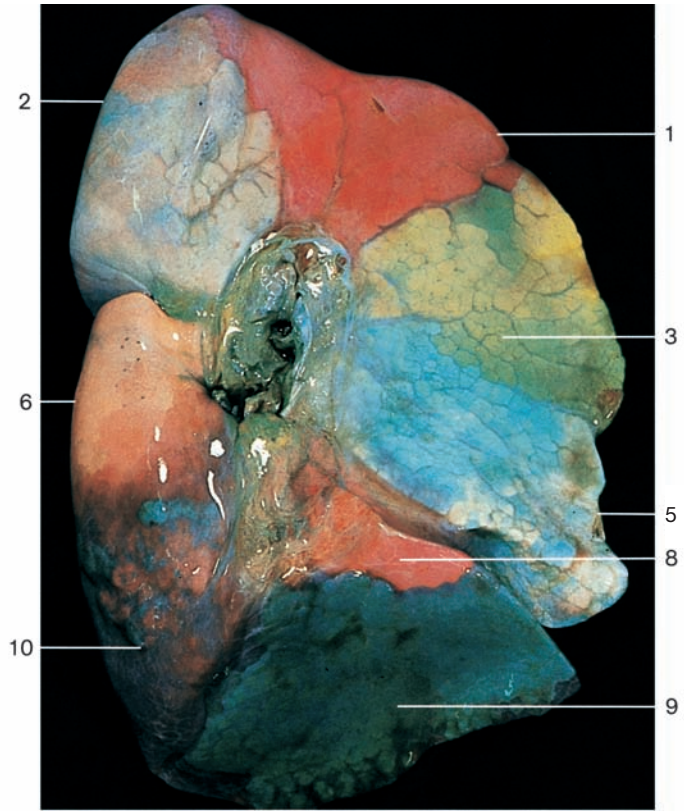
Right lung (medial aspect).

Left lung (medial aspect).

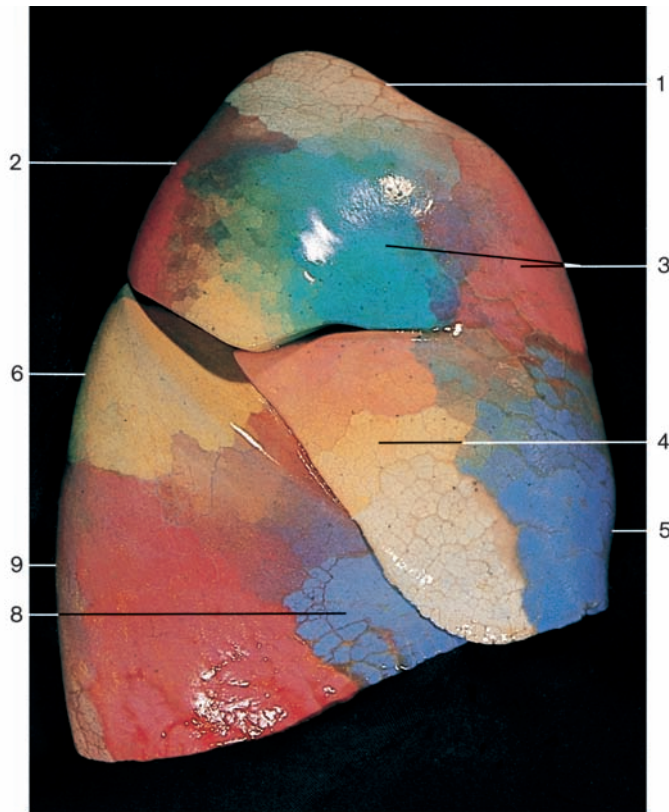
- | | | | |
|------------------------------------|---------------------------------------|-------------------------------------|-----------------------------|
| 1 Apex of lung | 8 Upper lobe of left lung | 15 Bronchi | 22 Left secondary bronchi |
| 2 Upper lobe of right lung | 9 Impressions of ribs | 16 Right pulmonary veins | 23 Groove of thoracic aorta |
| 3 Horizontal fissure of right lung | 10 Oblique fissure of left lung | 17 Pulmonary ligament | 24 Groove of esophagus |
| 4 Oblique fissure of right lung | 11 Lower lobe of left lung | 18 Diaphragmatic surface | 25 Cardiac impression |
| 5 Middle lobe of right lung | 12 Groove of subclavian artery | 19 Groove of aortic arch | 26 Lingula |
| 6 Lower lobe of right lung | 13 Groove of azygos arch | 20 Left pulmonary artery | |
| 7 Inferior border | 14 Branches of right pulmonary artery | 21 Branches of left pulmonary veins | |



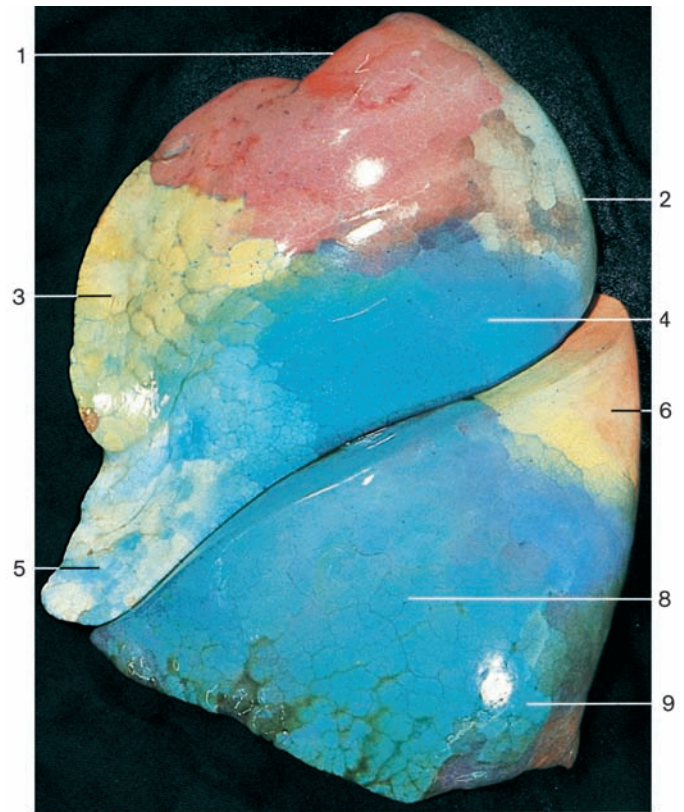
Right lung (medial aspect).



Left lung (medial aspect).

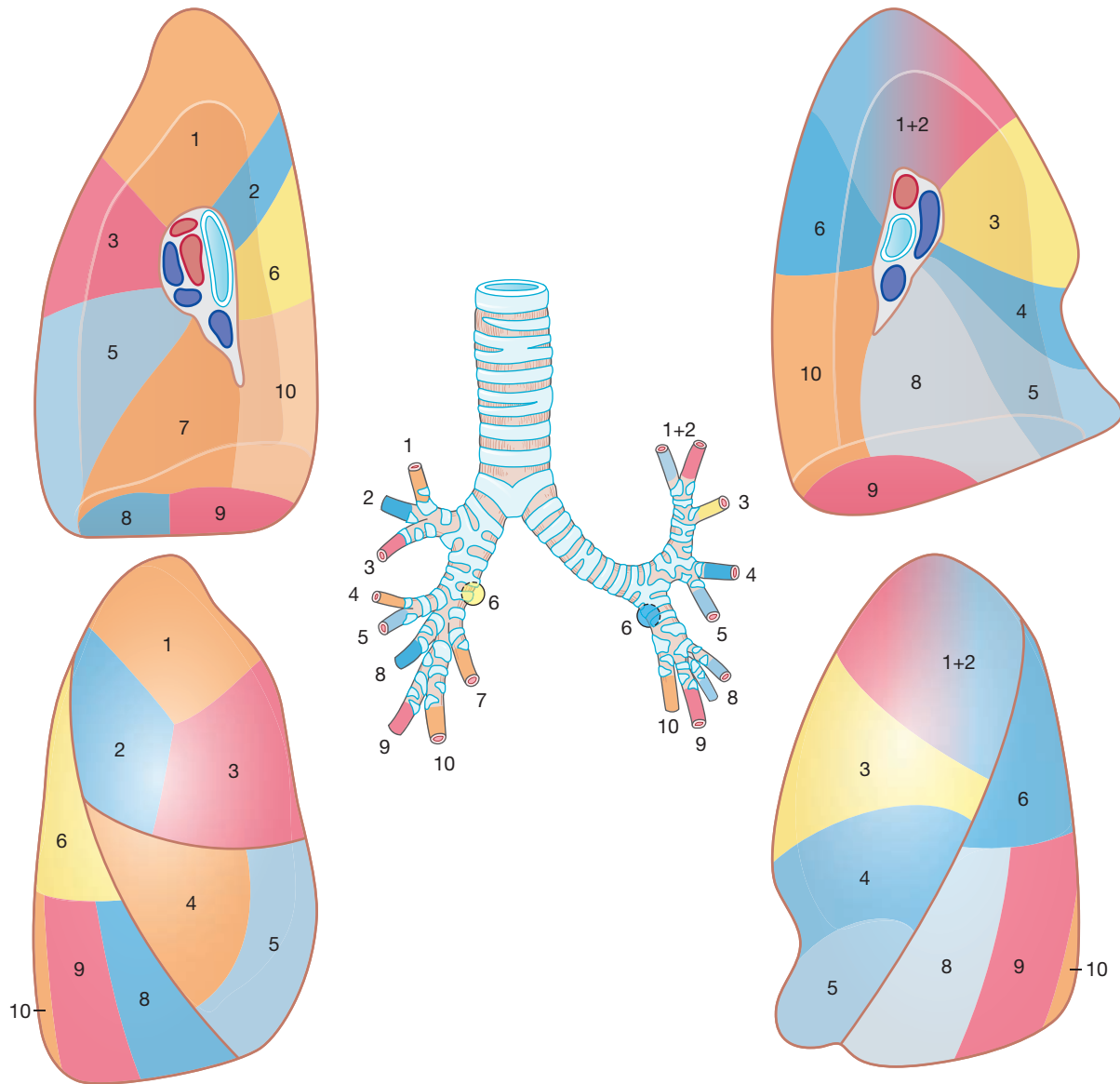


Right lung (lateral aspect).



Left lung (lateral aspect).

The bronchopulmonary segments of the lungs are differentiated by the various colors. Notice that there is no segment in the left lung that corresponds to the seventh segment of the right lung. Compare with the schematic drawing on the facing page.

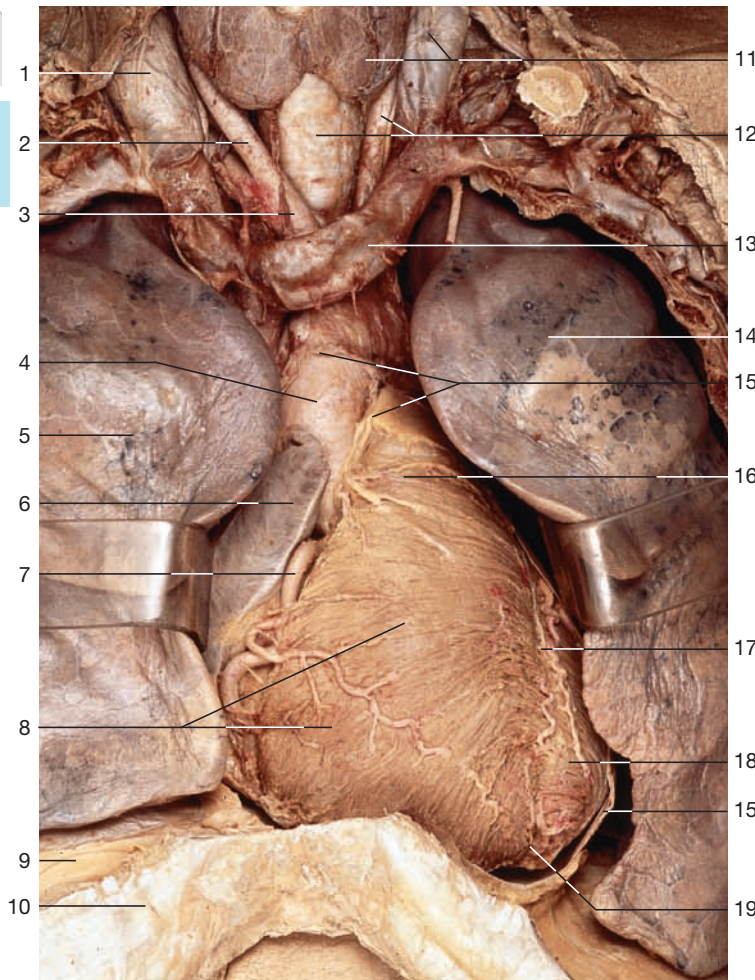
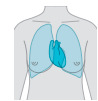


Distribution of bronchopulmonary segments of the lungs and their relation to the bronchial tree. (After J. F. Huber.)

The bronchopulmonary segments are morphologically and functionally separate, independent respiratory units of the lung tissue. Each segment is surrounded by connective tissue that is continuous with the visceral pleura. The segmental bronchi are centrally located in each segment and are closely accompanied by branches of the pulmonary

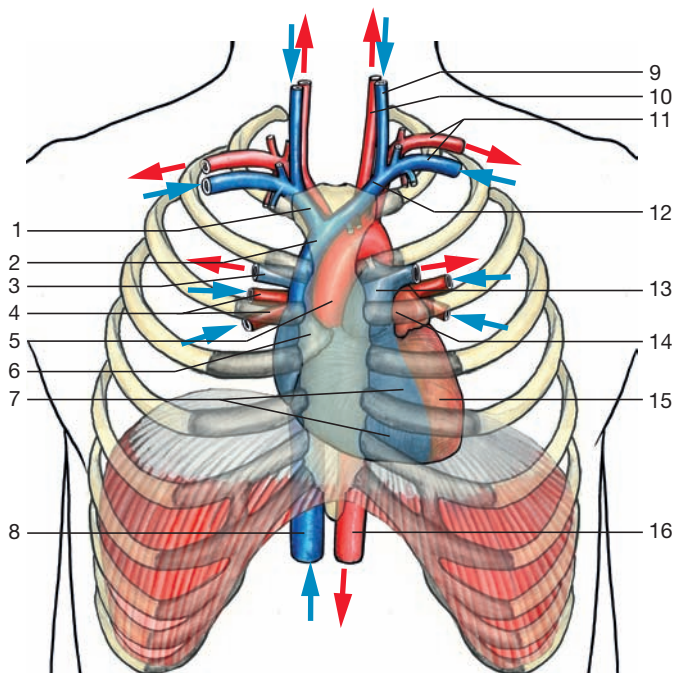
arteries, whereas the tributaries of the pulmonary veins run **between** the segments. Thus, the veins serve two adjacent segments that drain for the most part into more than one vein. A bronchopulmonary segment is therefore not a complete vascular unit, but segmentation is the result of a specific architecture of the lung vasculature.

Right lung	Left lung
1 Apical segment 2 Posterior segment 3 Anterior segment } Upper lobe bronchus	1+2 Apicoposterior segment 3 Anterior segment } Superior division
4 Lateral segment 5 Medial segment } Middle lobe bronchus	4 Superior lingular segment 5 Inferior lingular segment } Inferior division
6 Superior (apical) segment 7 Medial basal segment 8 Anterior basal segment 9 Lateral basal segment 10 Posterior basal segment } Lower lobe bronchus	6 Superior (apical) segment 7 Absent 8 Anteromedial basal segment 9 Lateral basal segment 10 Posterior basal segment } Lower lobe bronchus



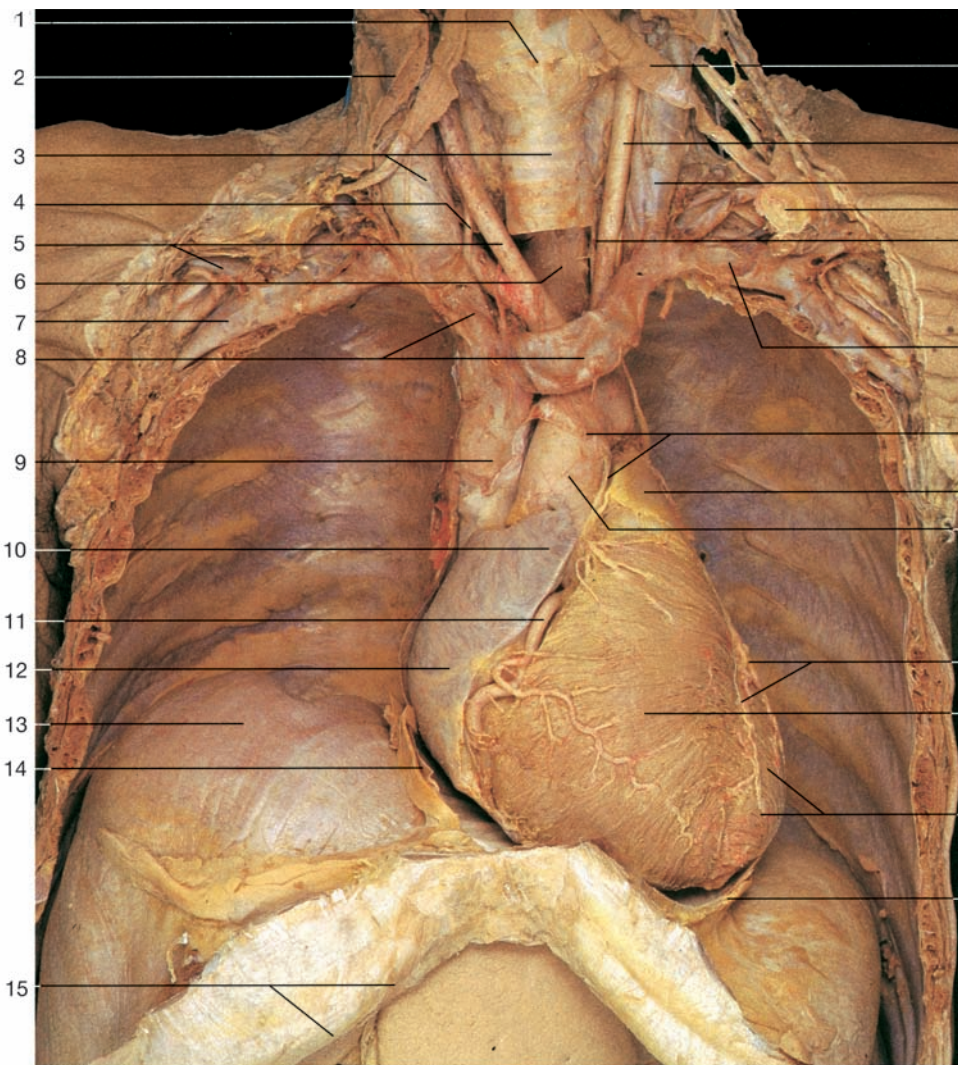
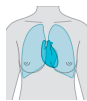
- 1 Internal jugular vein
- 2 Common carotid artery
- 3 Brachiocephalic trunk
- 4 Ascending aorta
- 5 Right lung
- 6 Right auricle
- 7 Right coronary artery
- 8 Myocardium of right ventricle
- 9 Diaphragm
- 10 Costal margin
- 11 Thyroid gland and internal jugular vein
- 12 Trachea and left common carotid artery
- 13 Left brachiocephalic vein
- 14 Left lung
- 15 Pericardium (cut edge)
- 16 Pulmonary trunk
- 17 Anterior interventricular artery
- 18 Myocardium of left ventricle
- 19 Apex of the heart

Heart and related vessels in situ (anterior aspect). Myocardium and coronary arteries have been displayed.



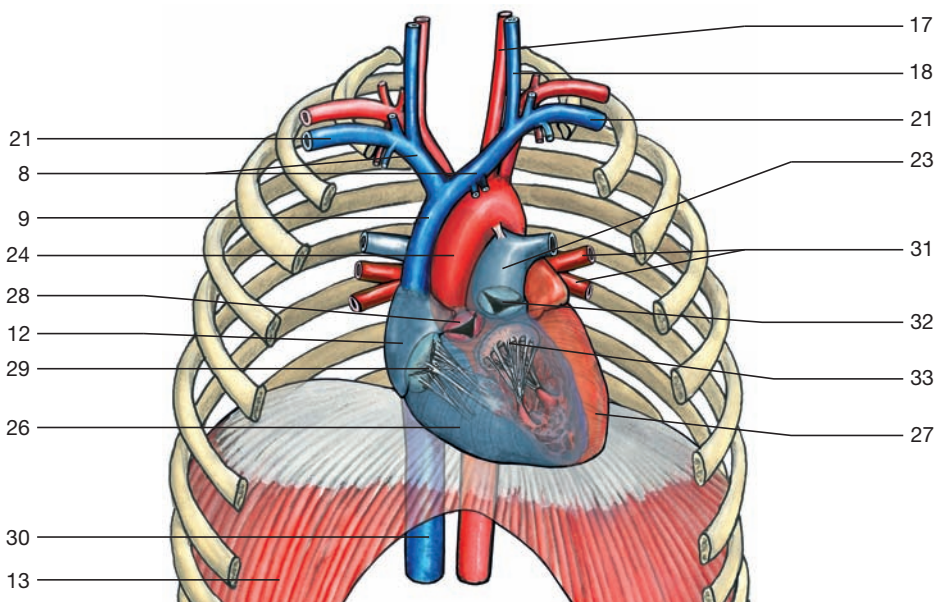
- 1 Right brachiocephalic vein
- 2 Superior vena cava
- 3 Right pulmonary artery
- 4 Right pulmonary veins
- 5 Ascending aorta
- 6 Right atrium
- 7 Right ventricle
- 8 Inferior vena cava
- 9 Left internal jugular vein
- 10 Left common carotid artery
- 11 Left axillary artery and vein
- 12 Left brachiocephalic vein
- 13 Pulmonary trunk
- 14 Left atrium
- 15 Left ventricle
- 16 Descending aorta

Position of heart and related vessels in the thoracic cavity (anterior aspect). Blue = regions of heart and vessels with venous blood flow; red = regions of heart and vessels with arterial blood flow; blue arrows: veins; red arrows: arteries.

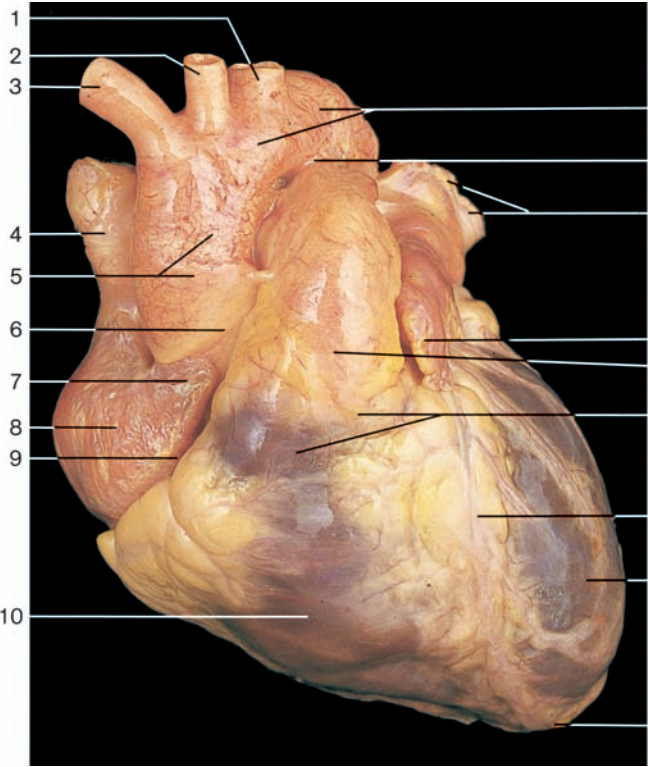
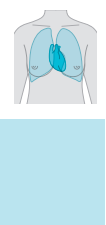


- 1 Larynx (thyroid cartilage)
- 2 Sternocleidomastoid muscle (divided)
- 3 Trachea (divided) and right internal jugular vein
- 4 Vagus nerve
- 5 Right common carotid artery and cephalic vein
- 6 Esophagus
- 7 Right axillary vein
- 8 Right and left brachiocephalic veins
- 9 Superior vena cava
- 10 Right auricle
- 11 Right coronary artery
- 12 Right atrium
- 13 Diaphragm
- 14 Pericardium (cut edges)
- 15 Costal margin
- 16 Omohyoid muscle
- 17 Left common carotid artery
- 18 Left internal jugular vein
- 19 Clavicle (divided)
- 20 Left recurrent laryngeal nerve
- 21 Subclavian vein
- 22 Pericardial reflection
- 23 Pulmonary trunk
- 24 Ascending aorta
- 25 Anterior interventricular sulcus and anterior interventricular branch of left coronary artery
- 26 Right ventricle
- 27 Left ventricle
- 28 Aortic valve
- 29 Tricuspid or right atrioventricular valve
- 30 Inferior vena cava
- 31 Pulmonary veins
- 32 Pulmonary valve
- 33 Left atrioventricular (bicuspid or mitral) valve

Heart and related vessels in situ (anterior aspect). Anterior thoracic wall, pericardium, and epicardium have been removed, the trachea has been divided.

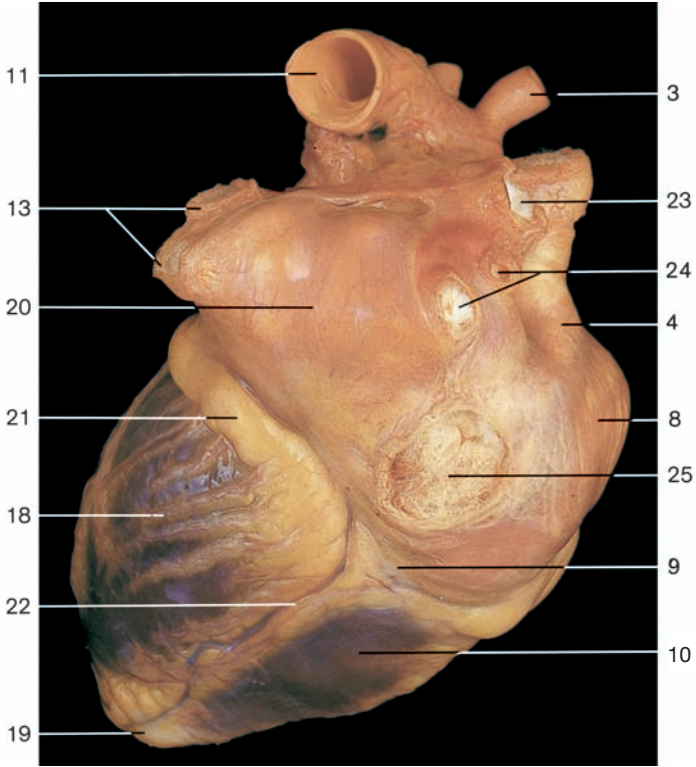


Heart and related vessels in situ (anterior aspect). Position of the valves.

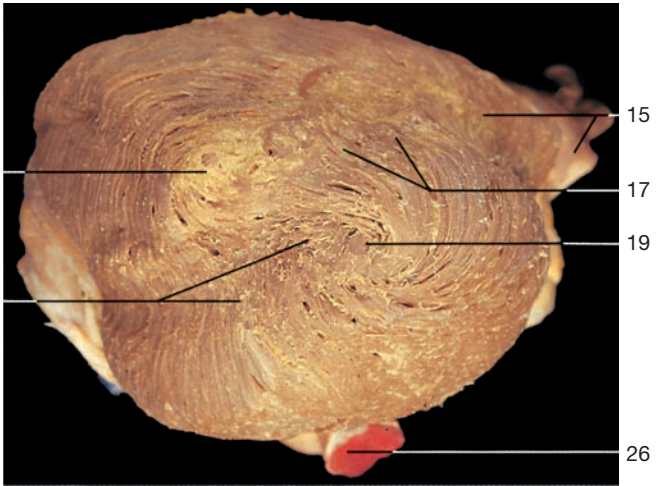
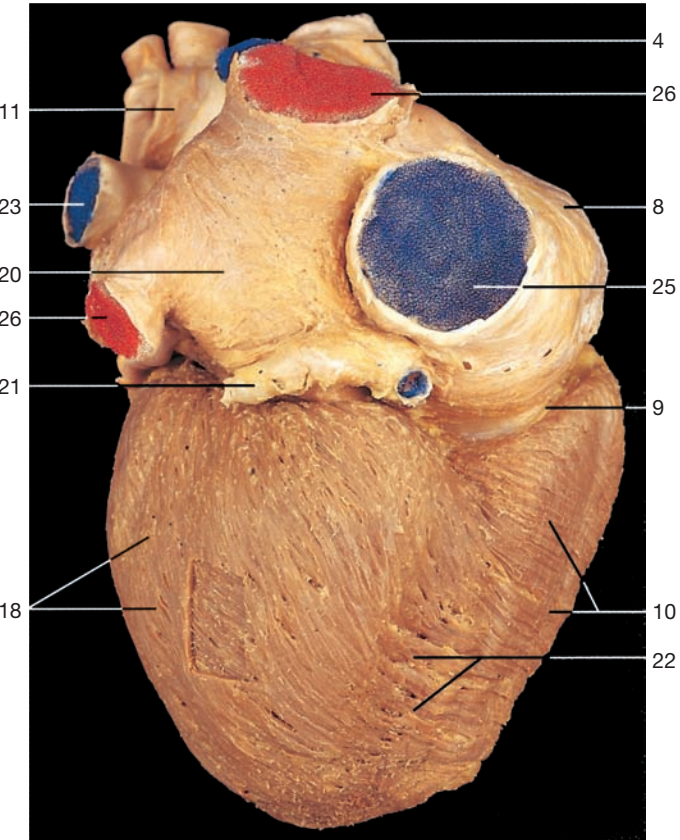


Heart of 30-year-old woman (anterior aspect).

- | | |
|------------------------------|-------------------------------------|
| 1 Left subclavian artery | 10 Right ventricle |
| 2 Left common carotid artery | 11 Aortic arch |
| 3 Brachiocephalic trunk | 12 Ligamentum arteriosum |
| 4 Superior vena cava | 13 Left pulmonary veins |
| 5 Ascending aorta | 14 Left auricle |
| 6 Bulb of the aorta | 15 Pulmonary trunk |
| 7 Right auricle | 16 Sinus of pulmonary trunk |
| 8 Right atrium | 17 Anterior interventricular sulcus |
| 9 Coronary sulcus | 18 Left ventricle |

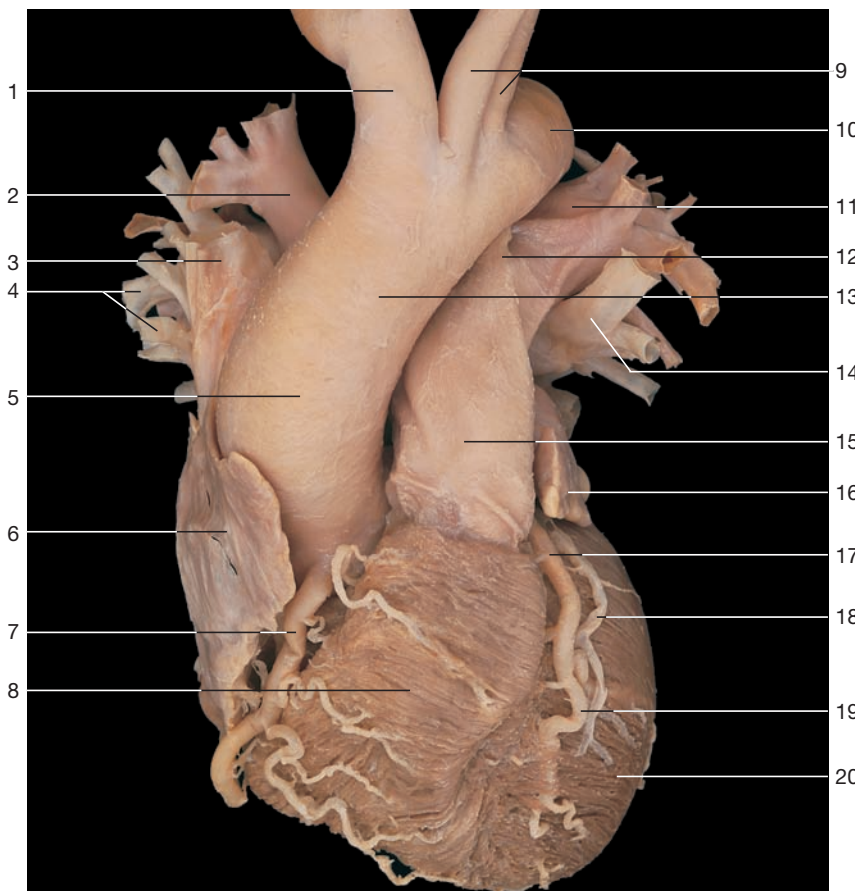


Heart of 30-year-old woman (oblique-posterior aspect).



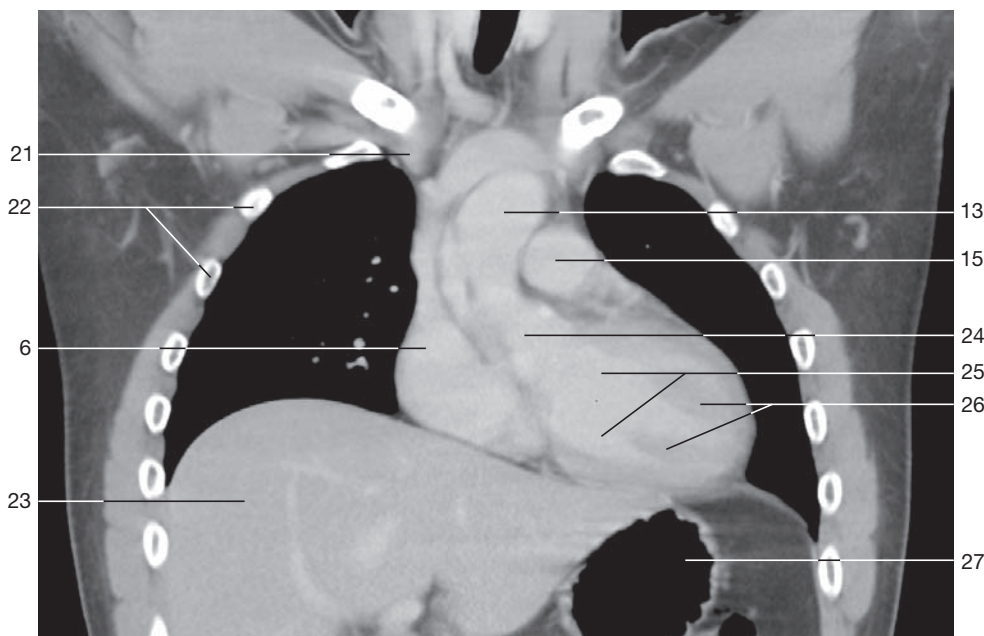
Vortex of cardiac muscle fibers (inferior aspect).

Heart (posterior aspect). The myocardium of the left ventricle has been fenestrated to show the muscle fiber bundles of the deeper layer with their more circular course.

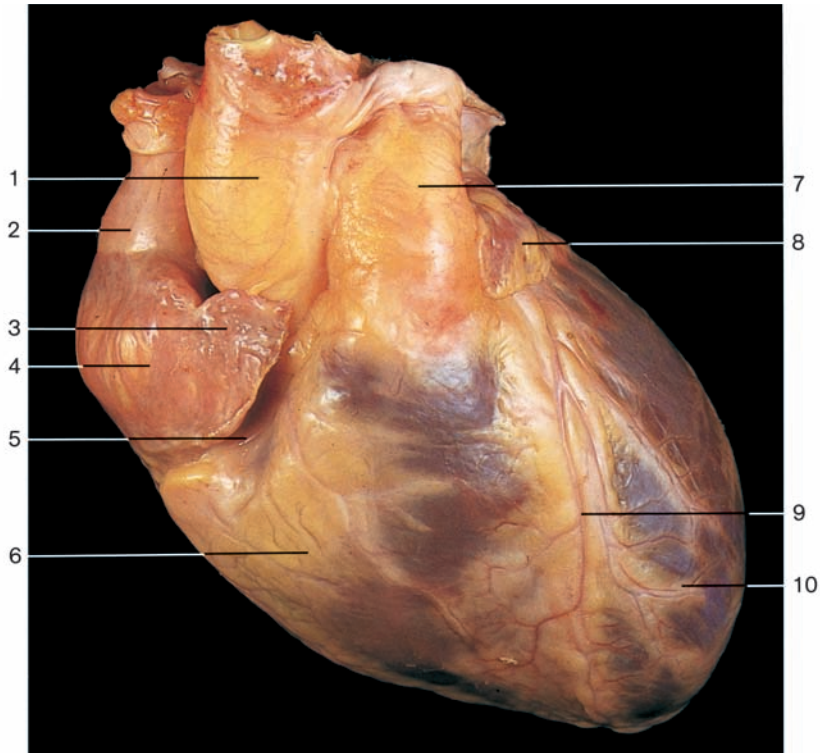


Heart with coronary arteries (anterior aspect, systolic phase of heart action).

- 1 Brachiocephalic trunk
- 2 Right pulmonary artery
- 3 Superior vena cava
- 4 Right pulmonary veins
- 5 Ascending aorta
- 6 Right atrium
- 7 Right coronary artery
- 8 Right ventricle
- 9 Left common carotid artery and left subclavian artery
- 10 Descending aorta (thoracic part)
- 11 Ligamentum arteriosum (remnant of ductus arteriosus Botalli)
- 12 Left pulmonary artery
- 13 Aortic arch
- 14 Left pulmonary veins
- 15 Pulmonary trunk
- 16 Left atrium
- 17 Left coronary artery
- 18 Diagonal branch of anterior interventricular vein
- 19 Interventricular branch of left coronary artery
- 20 Left ventricle
- 21 Left brachiocephalic vein
- 22 Thoracic wall
- 23 Liver
- 24 Aortic valve
- 25 Chordae tendineae
- 26 Papillary muscles
- 27 Stomach

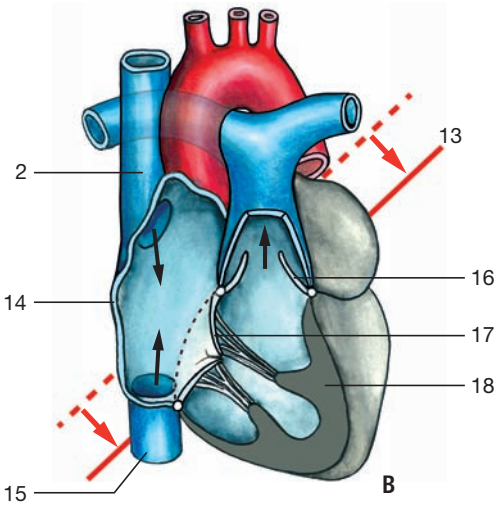
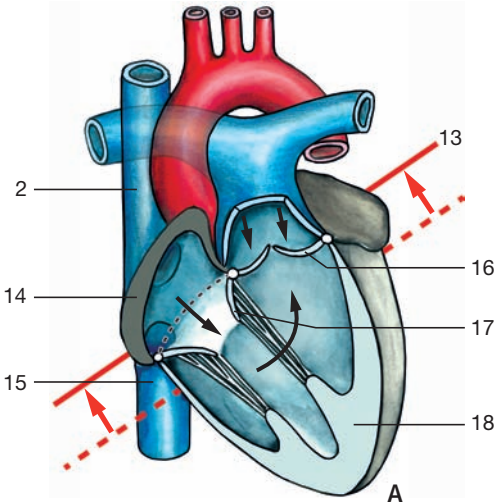


Coronal section through the thorax at the level of the ascending aorta (MRI scan).
(Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

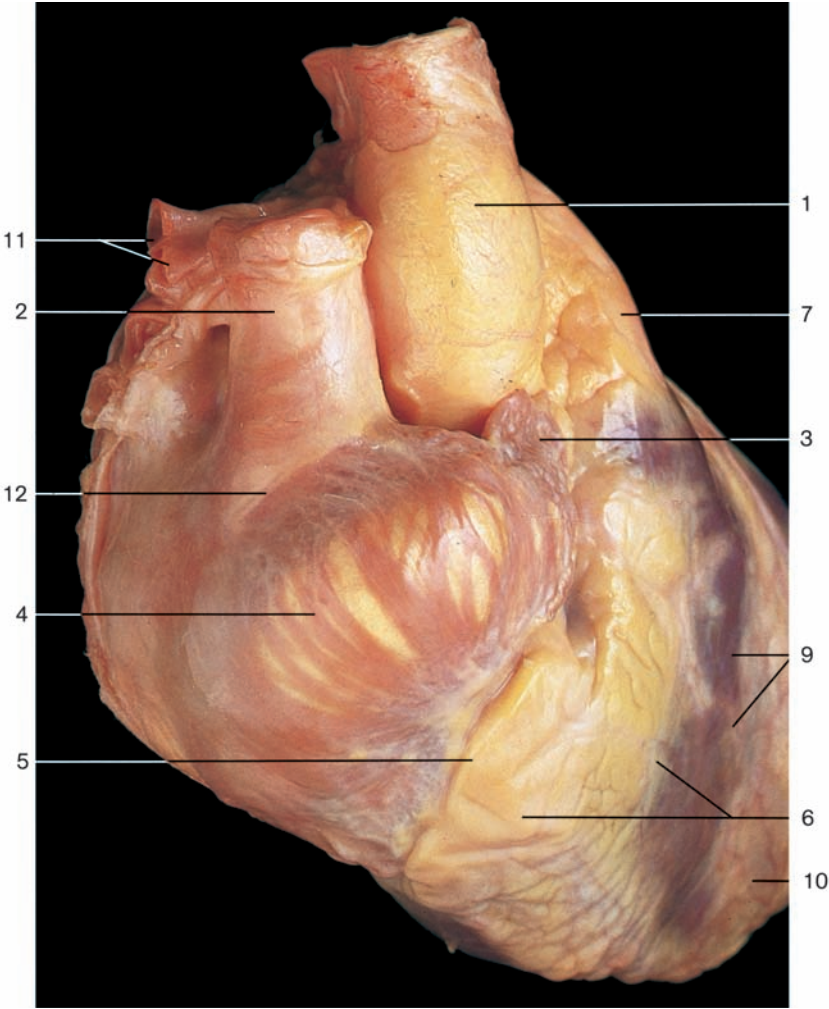


Heart, fixed in diastole (anterior aspect). The ventricles are relaxed, atria contracted.

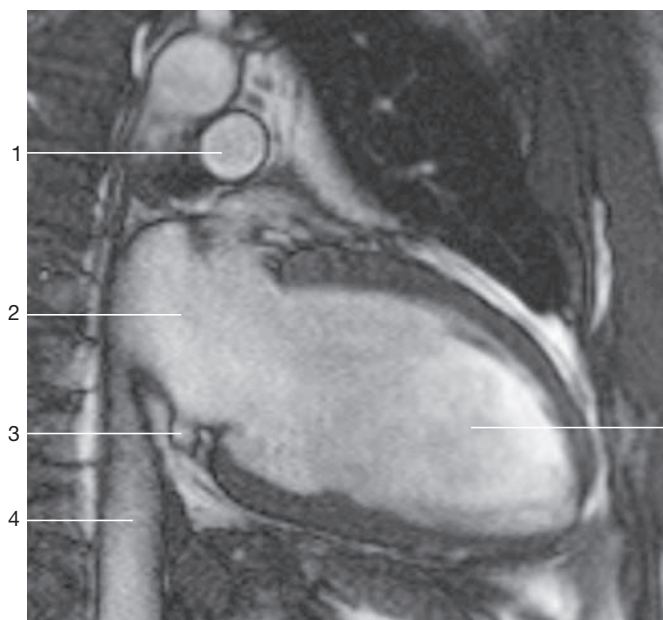
- 1 Ascending aorta
- 2 Superior vena cava
- 3 Right auricle
- 4 Right atrium
- 5 Coronary sulcus
- 6 Right ventricle
- 7 Pulmonary trunk
- 8 Left auricle
- 9 Anterior interventricular sulcus
- 10 Left ventricle
- 11 Right pulmonary artery
- 12 Sulcus terminalis with sinu-atrial node
- 13 Line indicating plane of position of valves
- 14 Myocardium of right atrium
- 15 Inferior vena cava
- 16 Valve of pulmonary trunk
- 17 Right tricuspid valve
- 18 Myocardium of right ventricle



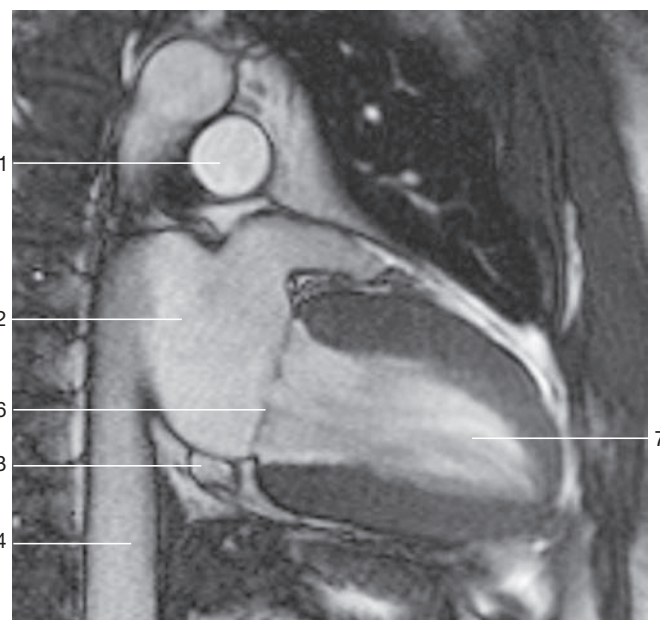
Morphological changes during heart movements. Note the changes in position of the valves (red arrows). Contracted portions of heart are indicated in dark gray. A = **Diastole**: muscles of the ventricles relaxed, atrioventricular valves open, semilunar valves closed. B = **Systole**: muscles of ventricles contracted, atrioventricular valves closed, semilunar valves open.



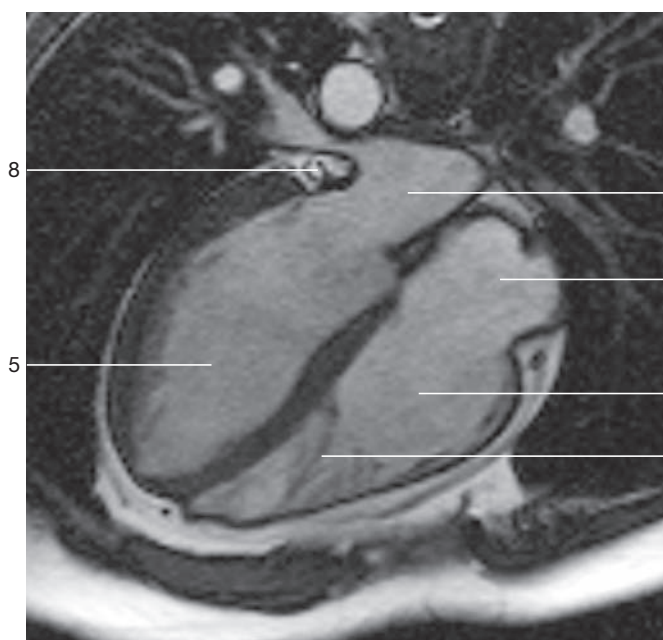
Heart, fixed in systole (antero-lateral aspect). The ventricles are contracted, atria dilated.



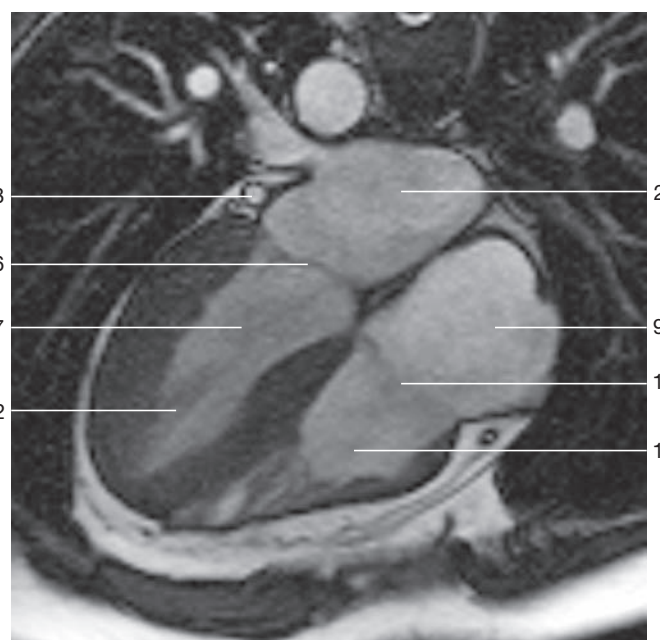
Coronal section through the thorax at the level of the left ventricle in dilation (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



Coronal section through the thorax at the level of the left ventricle in contraction (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



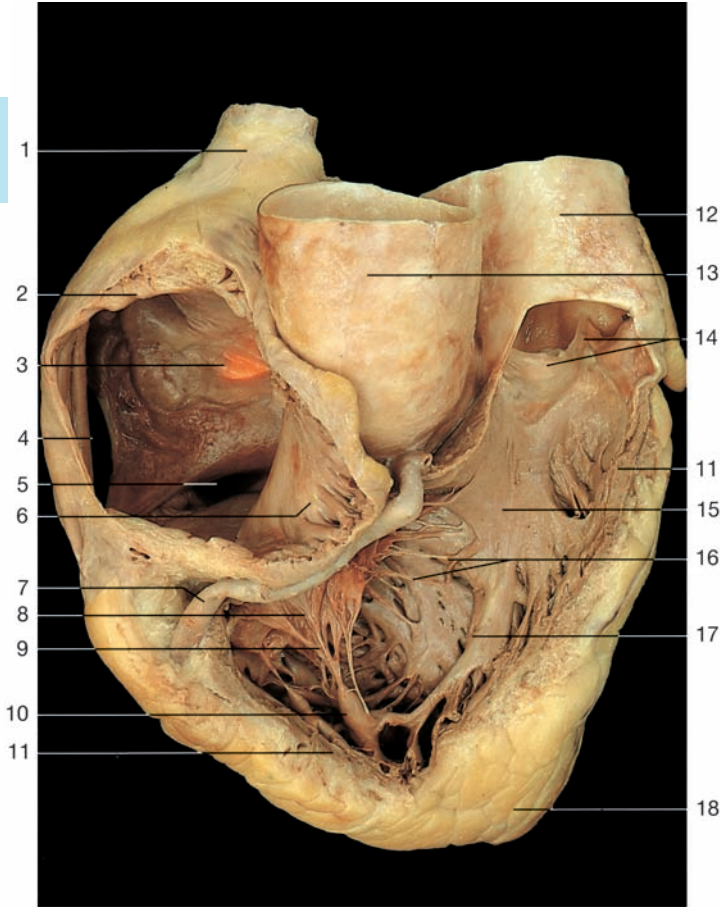
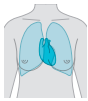
Coronal section through the human heart in the process of dilation (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



Coronal section through the human heart in the process of contraction (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

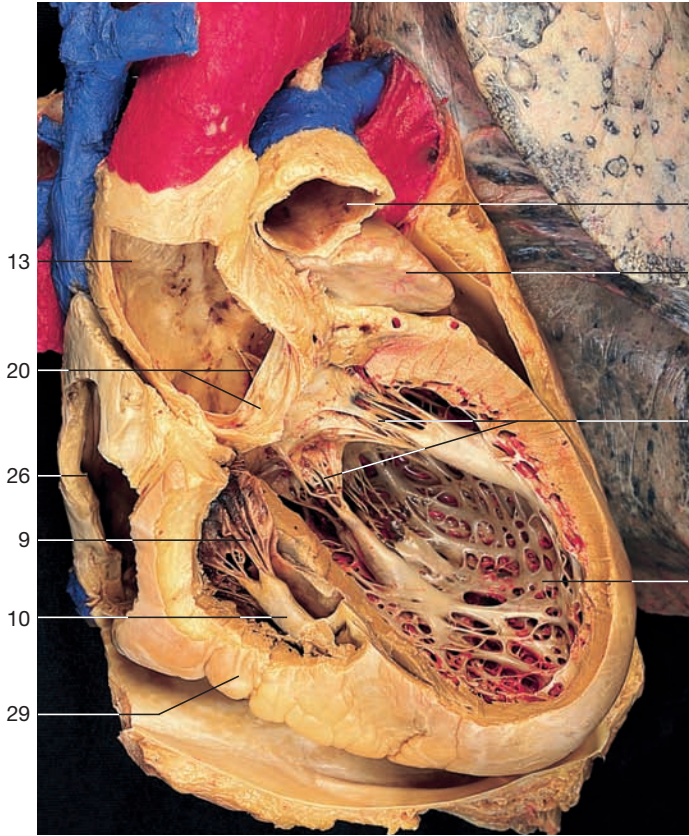
- 1 Pulmonary artery
- 2 Left atrium
- 3 Coronary sinus
- 4 Inferior vena cava
- 5 Left ventricle (dilated)
- 6 Left atrioventricular (mitral) valve
- 7 Left ventricle (contracted)

- 8 Great cardiac vein (left coronary vein)
- 9 Right atrium
- 10 Right ventricle
- 11 Septomarginal trabecula
- 12 Papillary muscle
- 13 Right atrioventricular (tricuspid) valve

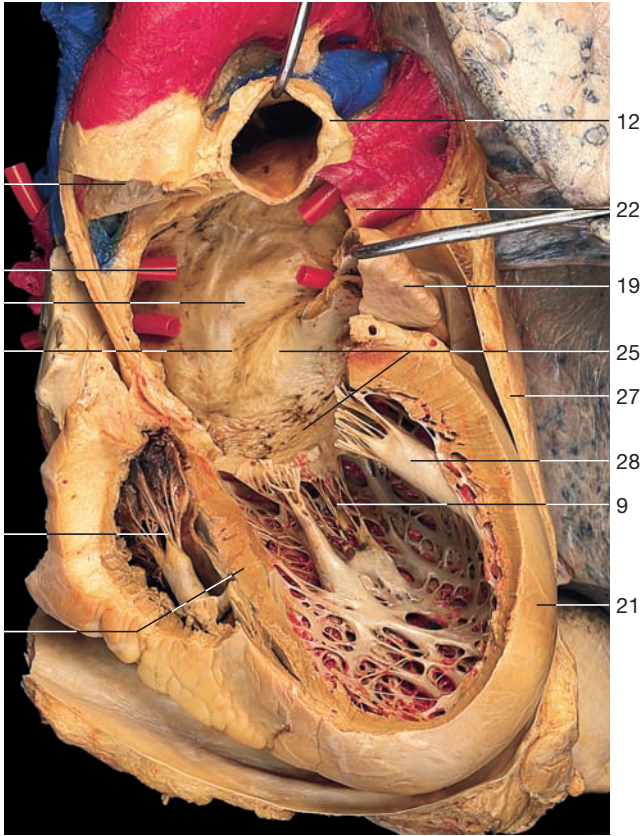


- 1 Superior vena cava
- 2 Crista terminalis
- 3 Fossa ovalis
- 4 Opening of inferior vena cava
- 5 Opening of coronary sinus
- 6 Right auricle
- 7 Right coronary artery and coronary sulcus
- 8 Anterior cusp of tricuspid valve
- 9 Chordae tendineae
- 10 Anterior papillary muscle
- 11 Myocardium
- 12 Pulmonary trunk
- 13 Ascending aorta
- 14 Pulmonic valve
- 15 Conus arteriosus (interventricular septum)
- 16 Septal papillary muscles
- 17 Septomarginal trabecula or moderator band
- 18 Apex of heart
- 19 Left auricle
- 20 Aortic valve
- 21 Left ventricle
- 22 Pulmonary veins
- 23 Position of fossa ovalis
- 24 Left atrium
- 25 Left atrioventricular (bicuspid or mitral) valve
- 26 Right atrium
- 27 Pericardium
- 28 Posterior papillary muscle
- 29 Right ventricle
- 30 Interventricular septum

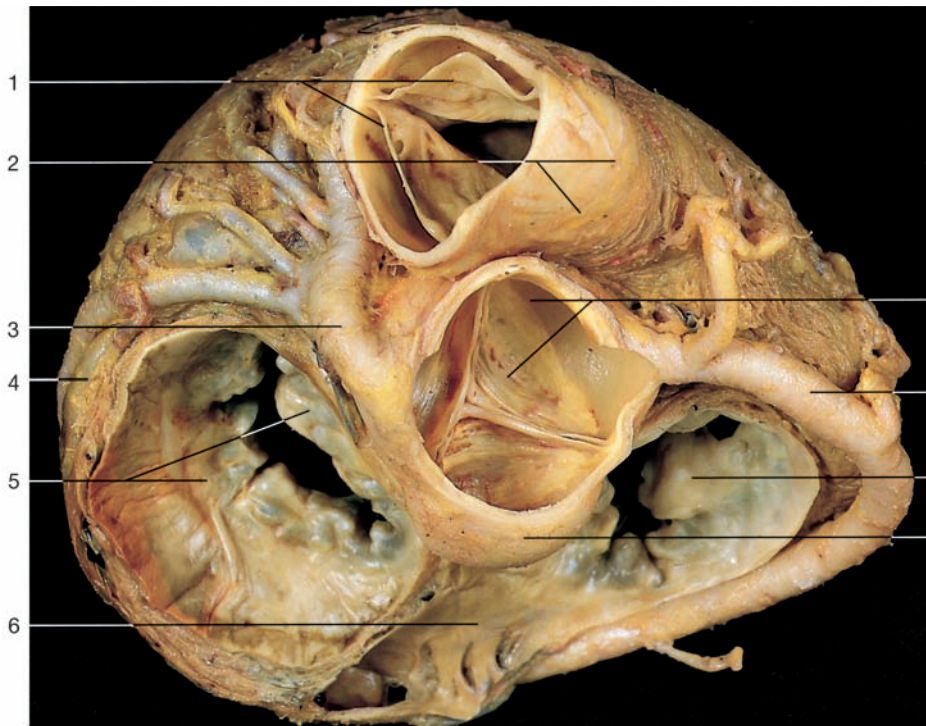
Right heart (anterior aspect). Anterior wall of right atrium and ventricle removed.



Heart, left ventricle with mitral valve, papillary muscles, and aortic valve. Anterior portion of the heart removed.

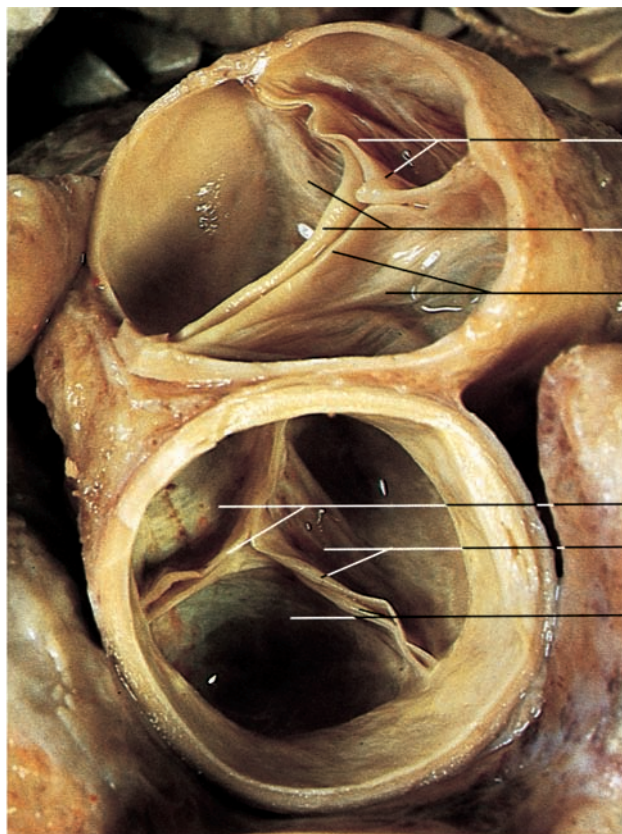


Heart, left ventricle with posterior part of mitral valve and papillary muscles. Atrium opened.

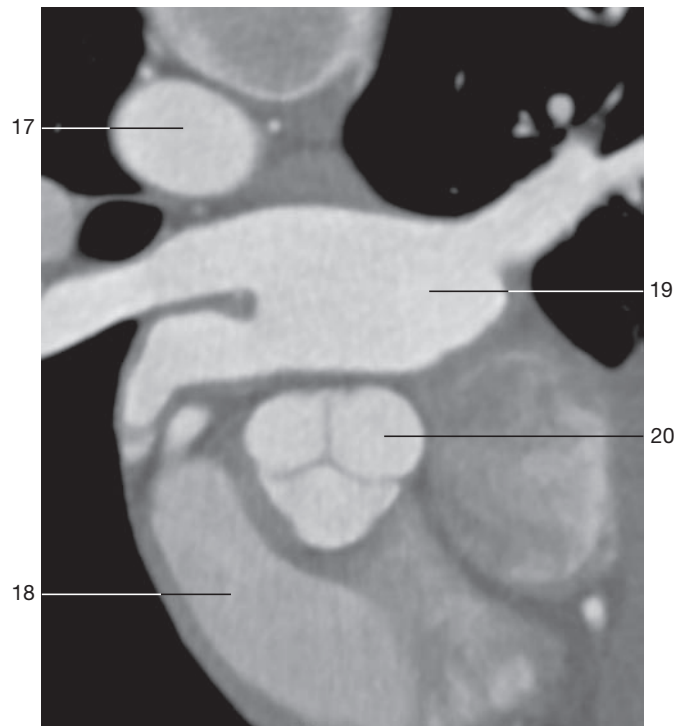


- 1 Pulmonic valve
- 2 Sinus of pulmonary trunk
- 3 Left coronary artery
- 4 Great cardiac vein
- 5 Left atrioventricular (mitral) valve
- 6 Coronary sinus
- 7 Aortic valve
- 8 Right coronary artery
- 9 Right atrioventricular (tricuspid) valve
- 10 Bulb of aorta
- 11 Anterior semilunar cusp of pulmonic valve
- 12 Left semilunar cusp of pulmonic valve
- 13 Right semilunar cusp of pulmonic valve
- 14 Left semilunar cusp of aortic valve
- 15 Right semilunar cusp of aortic valve
- 16 Posterior semilunar cusp of aortic valve
- 17 Pulmonary artery
- 18 Right atrium
- 19 Left atrium with pulmonary veins
- 20 Ascending aorta with aortic valve

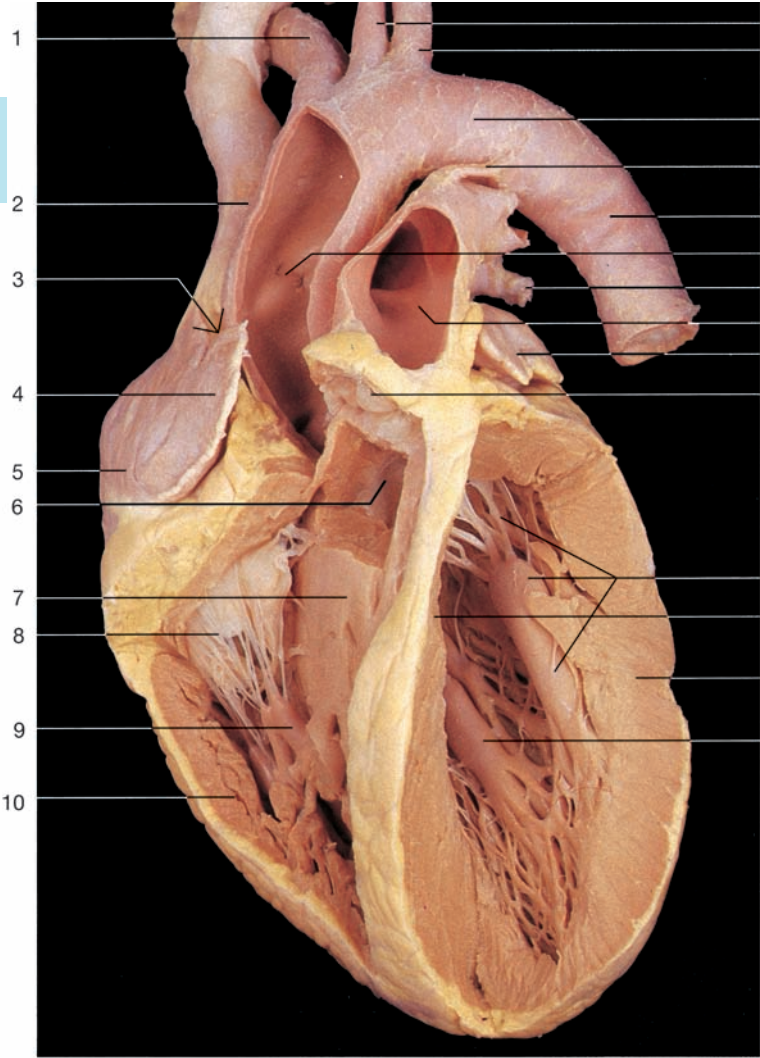
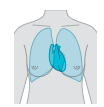
Valves of the heart (superior aspect). Left and right atria removed. Dissection of coronary arteries. Anterior wall of the heart at the top.



Pulmonic and aortic valves (superior aspect). Both valves are closed. Anterior wall of the heart at the top.



Horizontal section through the heart at the level of the aortic valve (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



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- 1 Brachiocephalic trunk

2 Superior vena cava

3 Sulcus terminalis

4 Right auricle

5 Right atrium

6 Aortic valve

7 Conus arteriosus (interventricular septum)

8 Right atrioventricular (tricuspid) valve

9 Anterior papillary muscle

10 Myocardium of right ventricle

11 Left common carotid artery

12 Left subclavian artery

13 Aortic arch

14 Ligamentum arteriosum (remnant of ductus arteriosus)

15 Thoracic aorta (descending aorta)

16 Ascending aorta

17 Left pulmonary vein

18 Pulmonary trunk

19 Left auricle

20 Pulmonic valve

21 Anterior papillary muscle with chordae tendineae

22 Myocardium of left ventricle

23 Posterior papillary muscle

24 Interventricular septum

25 Brachiocephalic veins

26 Chordae tendineae

27 Papillary muscles of right ventricle

28 Left atrium

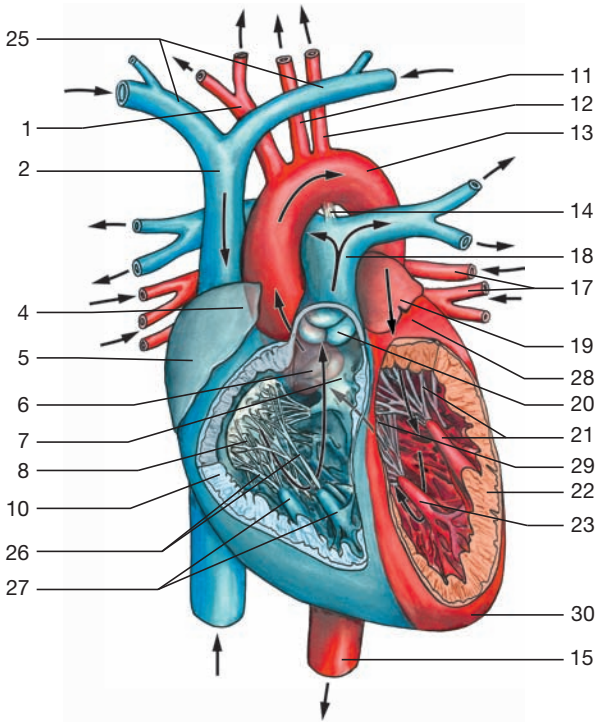
29 Left atrioventricular (bicuspid or mitral) valve and chordae tendineae

30 Apex of the heart

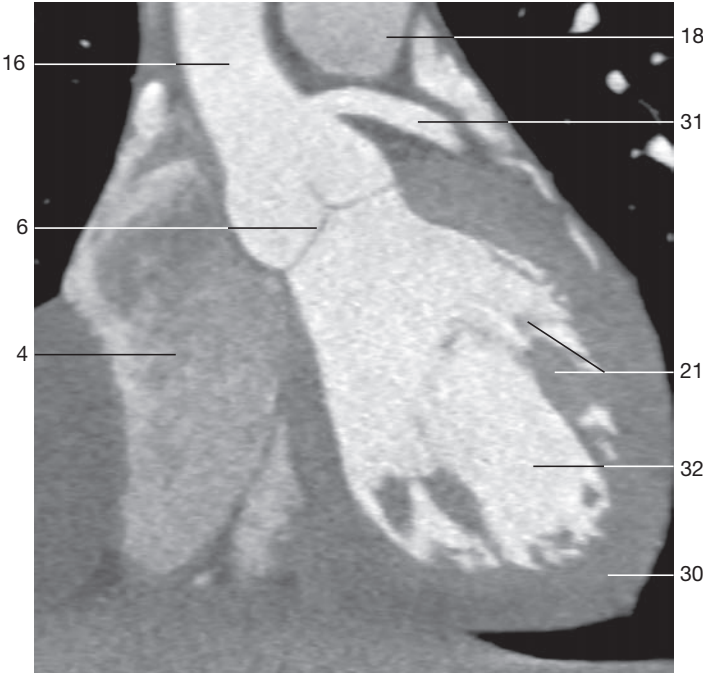
31 Left coronary artery

32 Left ventricle

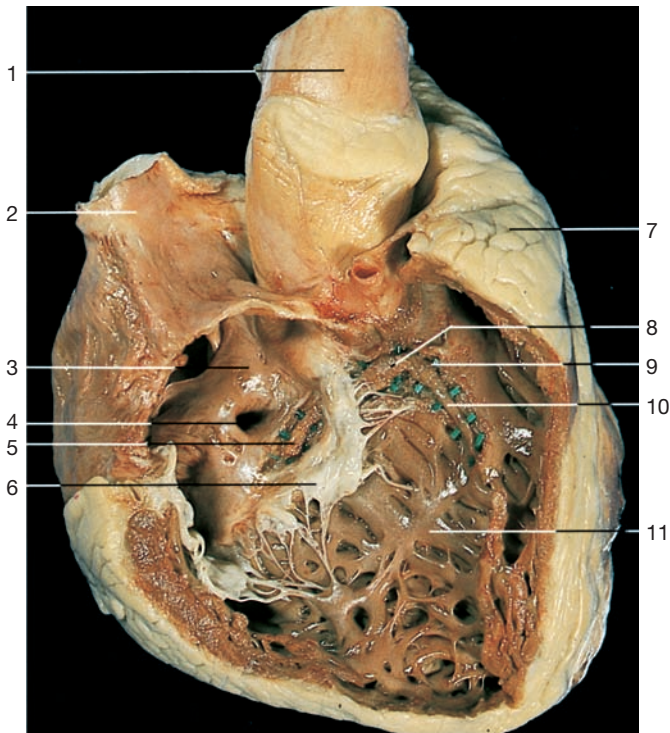
Heart (anterior aspect). Dissection of the four valves.



Circulation within the heart (anterior aspect).
Arrows: direction of blood flow.

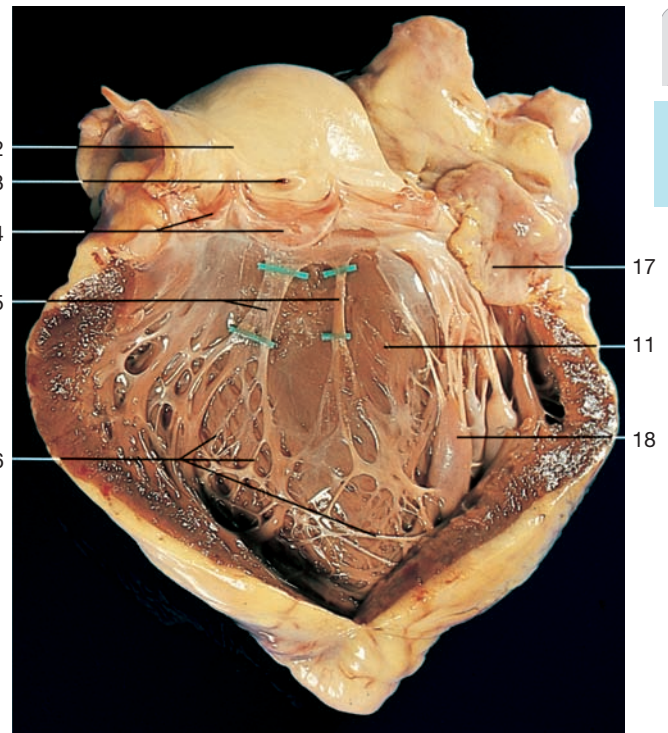


Frontal section through the heart at the level of left ventricle and ascending aorta (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.) Note the aortic valve.



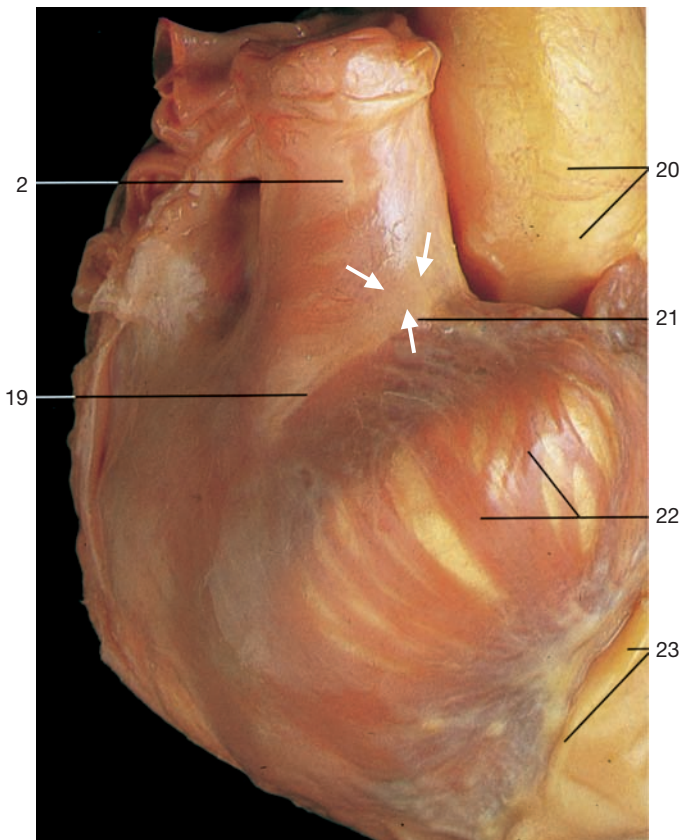
Right ventricle. Dissection of atrioventricular node, atrioventricular bundle (bundle of His), and right limb or bundle branch of conducting system (probes).

- | | |
|-----------------------------|---|
| 1 Ascending aorta | 6 Right atrioventricular valve |
| 2 Superior vena cava | 7 Pulmonary trunk |
| 3 Right atrium | 8 Atrioventricular bundle (bundle of His) |
| 4 Opening of coronary sinus | 9 Bifurcation of atrioventricular bundle |
| 5 Atrioventricular node | 10 Right bundle branch |

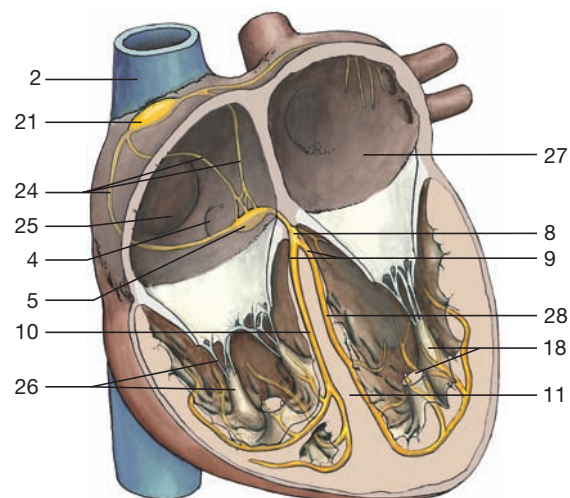


Left ventricle. Dissection of left limb or bundle branch of conducting system (probes).

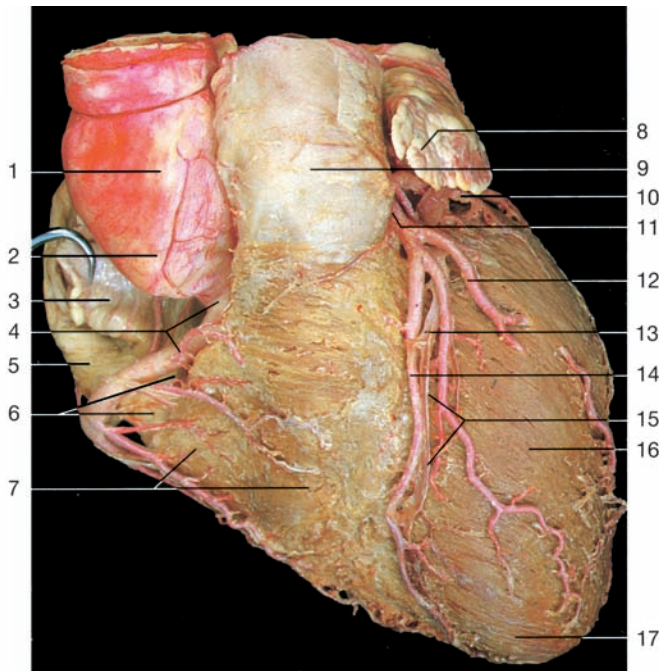
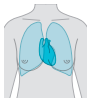
- | |
|---|
| 11 Interventricular septum |
| 12 Aortic sinus |
| 13 Entrance of left coronary artery |
| 14 Aortic valve |
| 15 Branches of left bundle branch |
| 16 Purkinje fibers |
| 17 Left auricle |
| 18 Anterior papillary muscles |
| 19 Sulcus terminalis |
| 20 Bulb of aorta |
| 21 Sinu-atrial node (arrows) |
| 22 Muscle fiber bundles of right atrium |
| 23 Coronary sulcus (with right coronary artery) |
| 24 Bundles of conducting system |
| 25 Inferior vena cava |
| 26 Papillary muscles with Purkinje fibers |
| 27 Left atrium |
| 28 Left bundle branch |



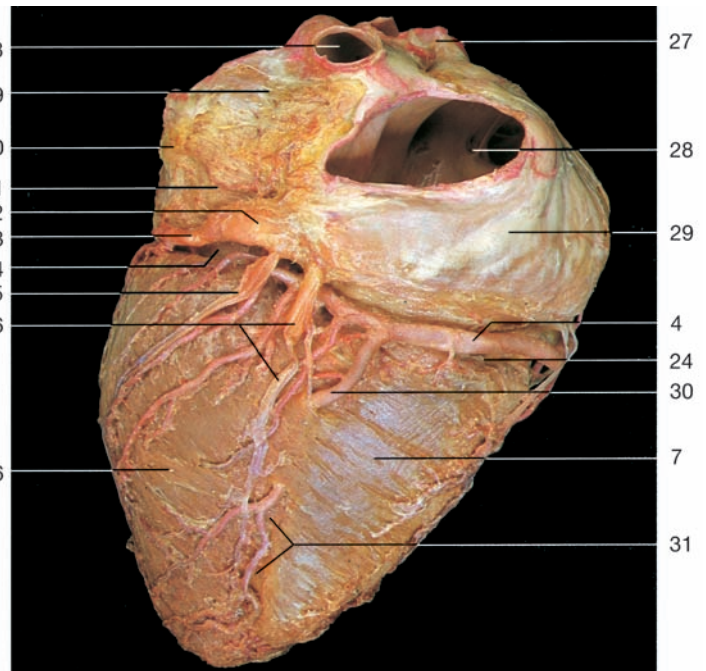
Right atrium. Anterior wall, showing the location of the sinu-atrial node (arrows).



Conducting system (yellow) of the heart.

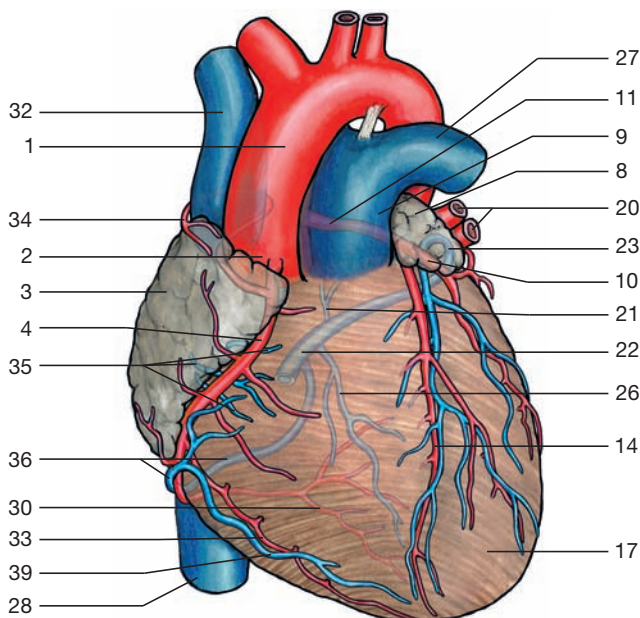


Coronary arteries (anterior aspect). The epicardium and subepicardial fatty tissue have been removed. The arteries have been injected with red resin from the aorta.

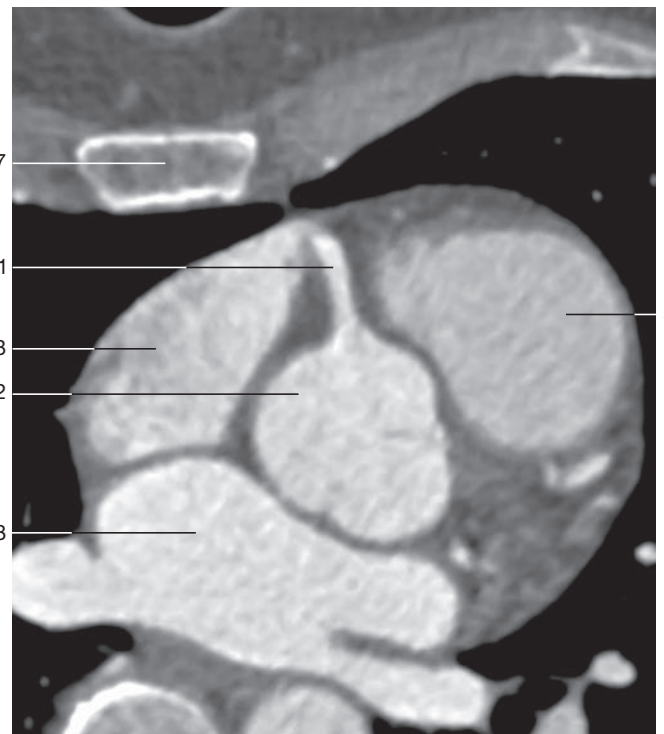


Right coronary artery and veins of the heart (posterior aspect). The epicardium and subepicardial fatty tissue have been removed. The arteries have been injected with red resin.

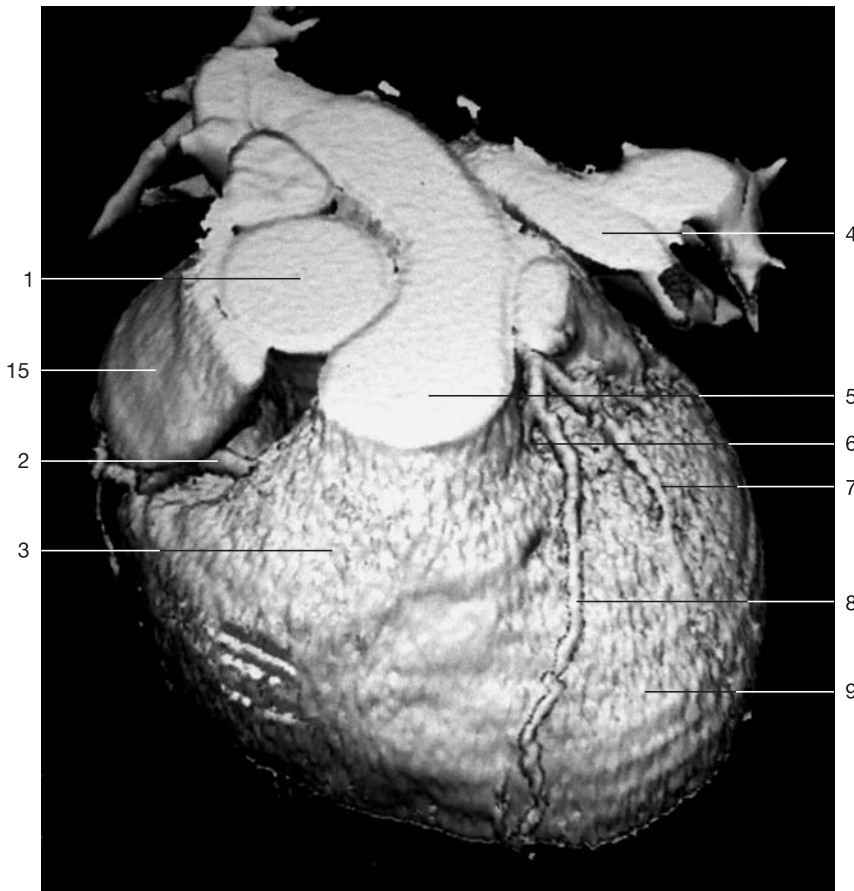
- | | | | |
|---|--|---|---|
| 1 Ascending aorta | 13 Anterior interventricular vein | 25 Posterior vein of left ventricle | 33 Right marginal branch of right coronary artery |
| 2 Aortic bulb and sinu-atrial branch of right coronary artery (in the dissection above) | 14 Anterior interventricular artery | 26 Middle cardiac vein | 34 Branch of sinu-atrial node |
| 3 Right auricle | 15 Anterior interventricular sulcus | 27 Left pulmonary artery | 35 Minimal cardiac veins |
| 4 Right coronary artery | 16 Left ventricle | 28 Inferior vena cava | 36 Small cardiac veins |
| 5 Right atrium | 17 Apex of the heart | 29 Right atrium | 37 Sternum |
| 6 Coronary sulcus | 18 Right pulmonary vein | 30 Posterior interventricular branch of right coronary artery | 38 Left atrium with pulmonary veins |
| 7 Right ventricle | 19 Left atrium | 31 Posterior interventricular sulcus | 39 Right marginal vein |
| 8 Left auricle | 20 Left pulmonary veins | 32 Superior vena cava | |
| 9 Pulmonary trunk | 21 Oblique vein of left atrium (Marshall's vein) | | |
| 10 Circumflex branch of left coronary artery | 22 Coronary sinus | | |
| 11 Left coronary artery | 23 Great cardiac vein | | |
| 12 Diagonal branch of left coronary artery | 24 Coronary sulcus (posterior part) | | |



Coronary arteries and veins of the heart (anterior aspect).

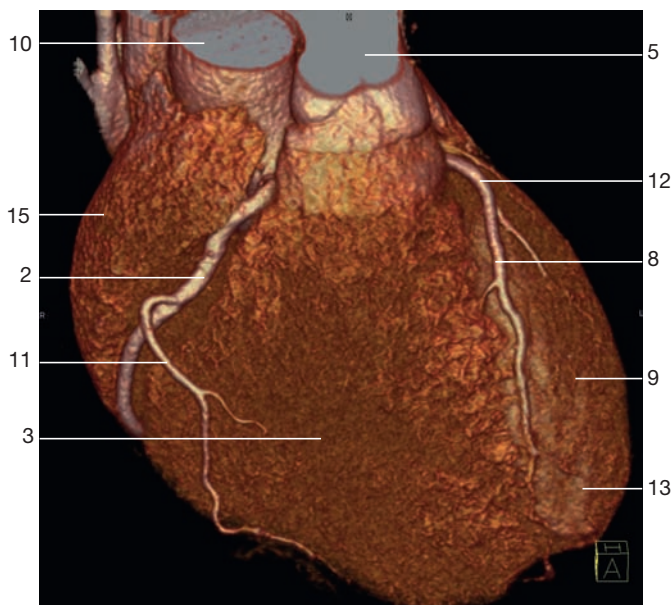


Horizontal section through heart and thoracic wall at the level of the aortic bulb (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

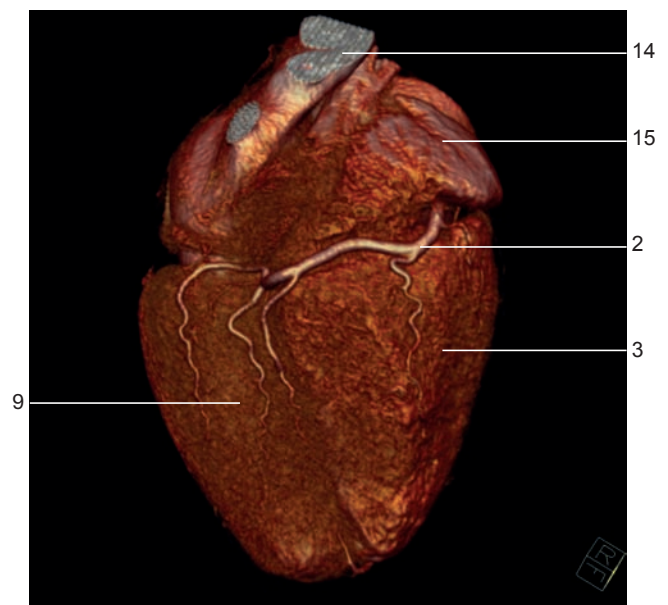


- 1 Ascending aorta
- 2 Right coronary artery
- 3 Right ventricle
- 4 Left atrium
- 5 Pulmonary trunk
- 6 Septal branch of left coronary artery
- 7 Diagonal branch of left coronary artery
- 8 Anterior interventricular branch of left coronary artery
- 9 Left ventricle
- 10 Aortic root
- 11 Right marginal branch of right coronary artery
- 12 Circumflex branch of left coronary artery
- 13 Apex of the heart
- 14 Superior vena cava
- 15 Right atrium

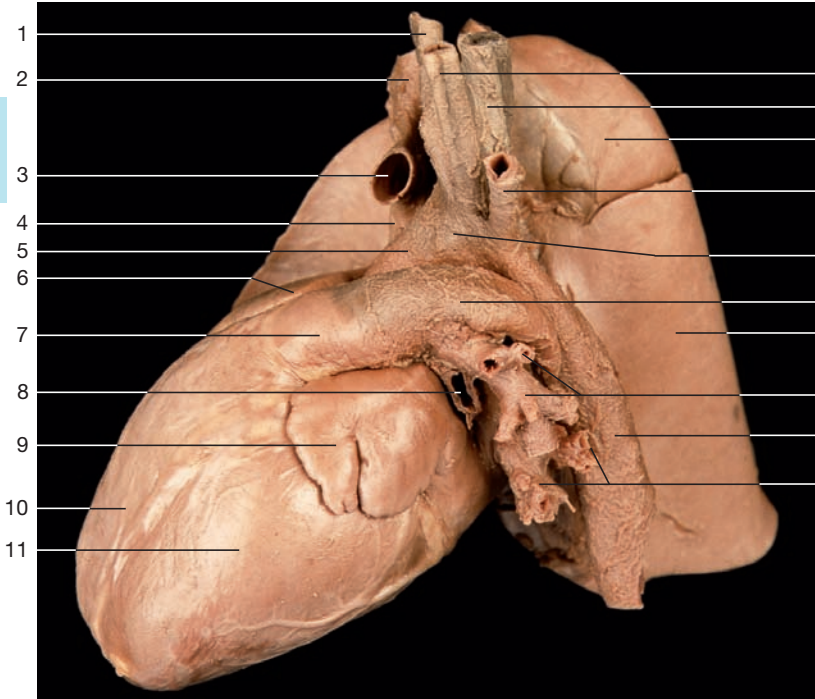
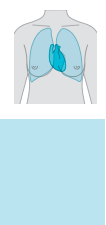
Human heart (3-D reconstruction of electron beam CT scans as "Shaded Surface Display").



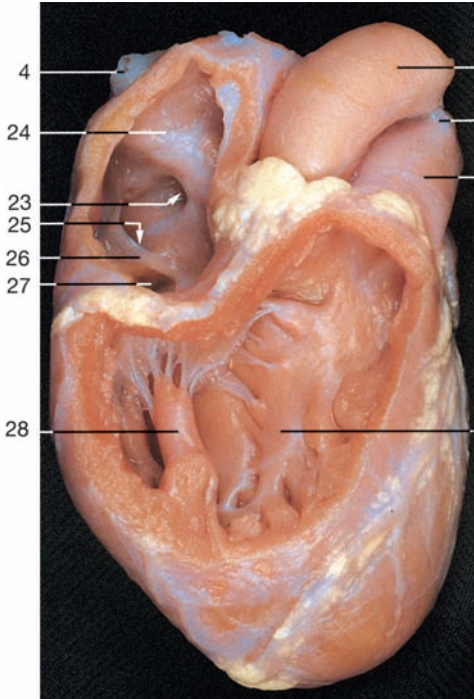
Coronary arteries (anterior aspect; stereoscopic MRI scan).
(Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



Coronary arteries (posterior aspect; stereoscopic MRI scan).
(Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

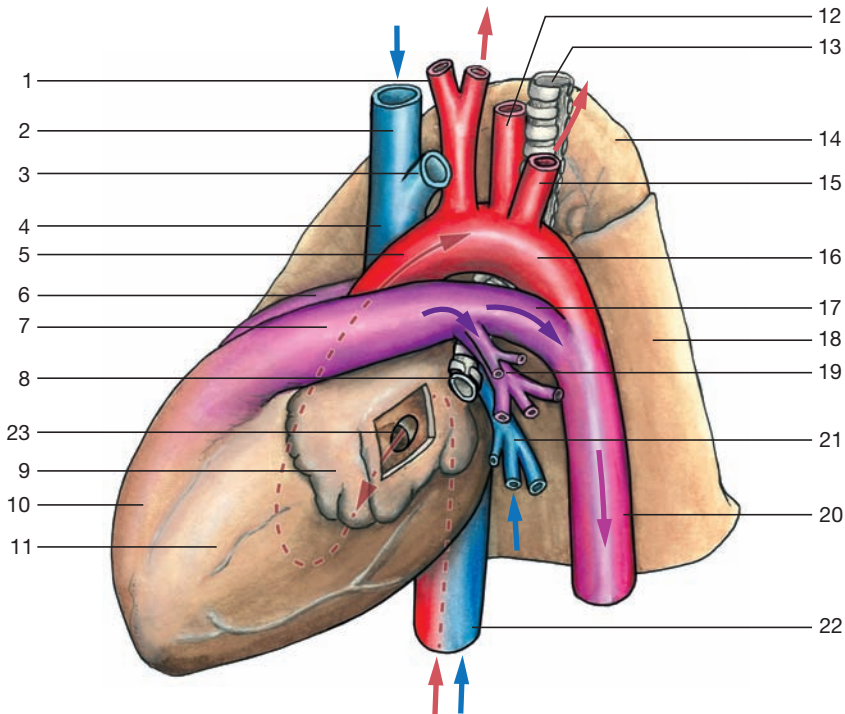


Heart and right lung of the fetus (viewed from left side). The left lung has been removed. Note the ductus arteriosus (Botalli).



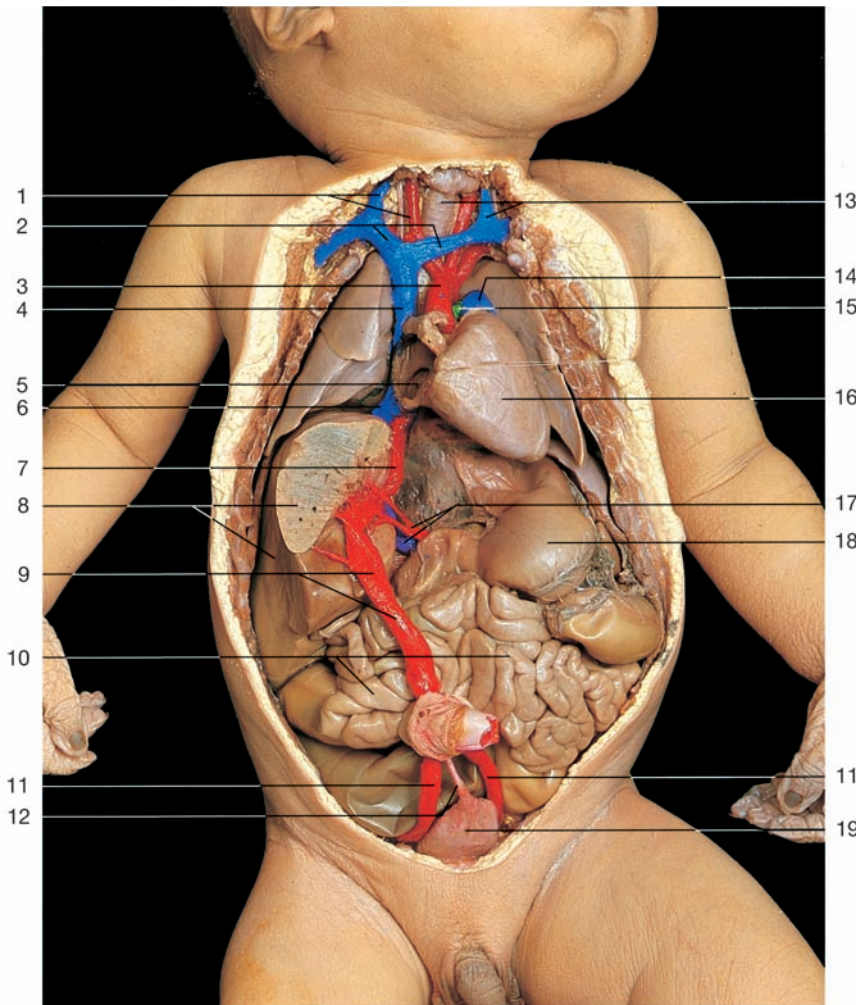
Heart of the fetus (anterior aspect). Right atrium and ventricle have been opened.

Shunts in the fetal circulation system		
1. Ductus venosus (of Arantius)	between umbilical vein and inferior vena cava	bypass of liver circulation
2. Foramen ovale	between right and left atrium	bypass of pulmonary circulation
3. Ductus arteriosus (Botalli)	between pulmonary trunk and aorta	



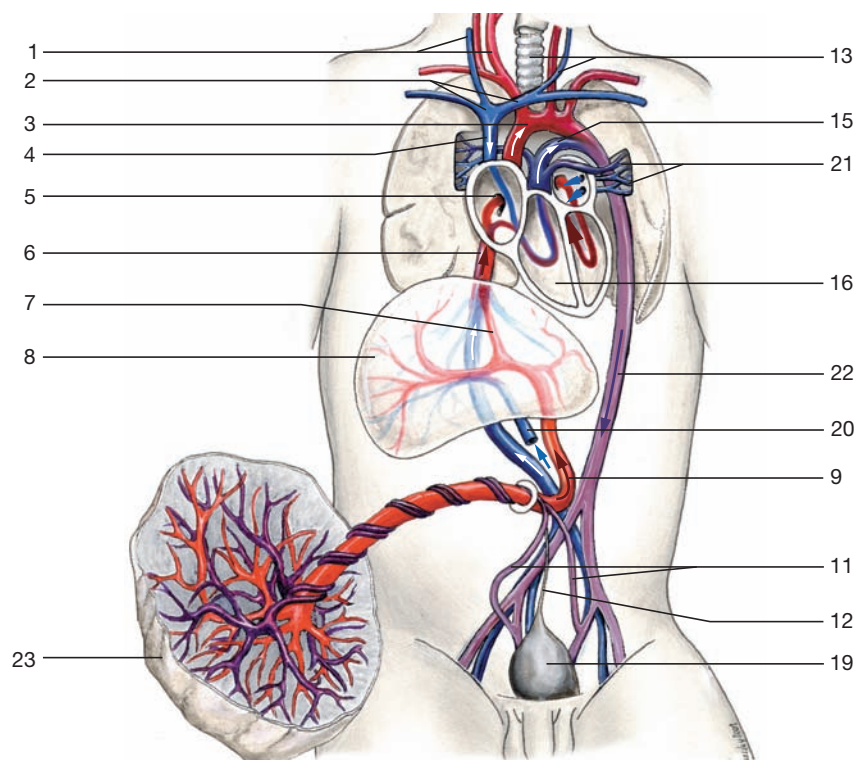
- 1 Right common carotid artery
- 2 Right brachiocephalic vein
- 3 Left brachiocephalic vein
- 4 Superior vena cava
- 5 Ascending aorta
- 6 Right auricle
- 7 Pulmonary trunk
- 8 Left primary bronchus
- 9 Left auricle
- 10 Right ventricle
- 11 Left ventricle
- 12 Left common carotid artery
- 13 Trachea
- 14 Superior lobe of right lung
- 15 Left subclavian artery
- 16 Aortic arch
- 17 Ductus arteriosus (Botalli)
- 18 Inferior lobe of right lung
- 19 Left pulmonary artery with branches to the left lung
- 20 Descending aorta
- 21 Left pulmonary veins
- 22 Inferior vena cava
- 23 Foramen ovale
- 24 Right atrium
- 25 Opening of inferior vena cava
- 26 Valve of inferior vena cava (Eustachian valve)
- 27 Opening of coronary sinus
- 28 Anterior papillary muscle of right ventricle

◁ Heart and right lung of the fetus (compare with the dissection above). Direction of blood flow indicated by arrows. Note the change in oxygenation of blood after ductus arteriosus entry into the aorta.

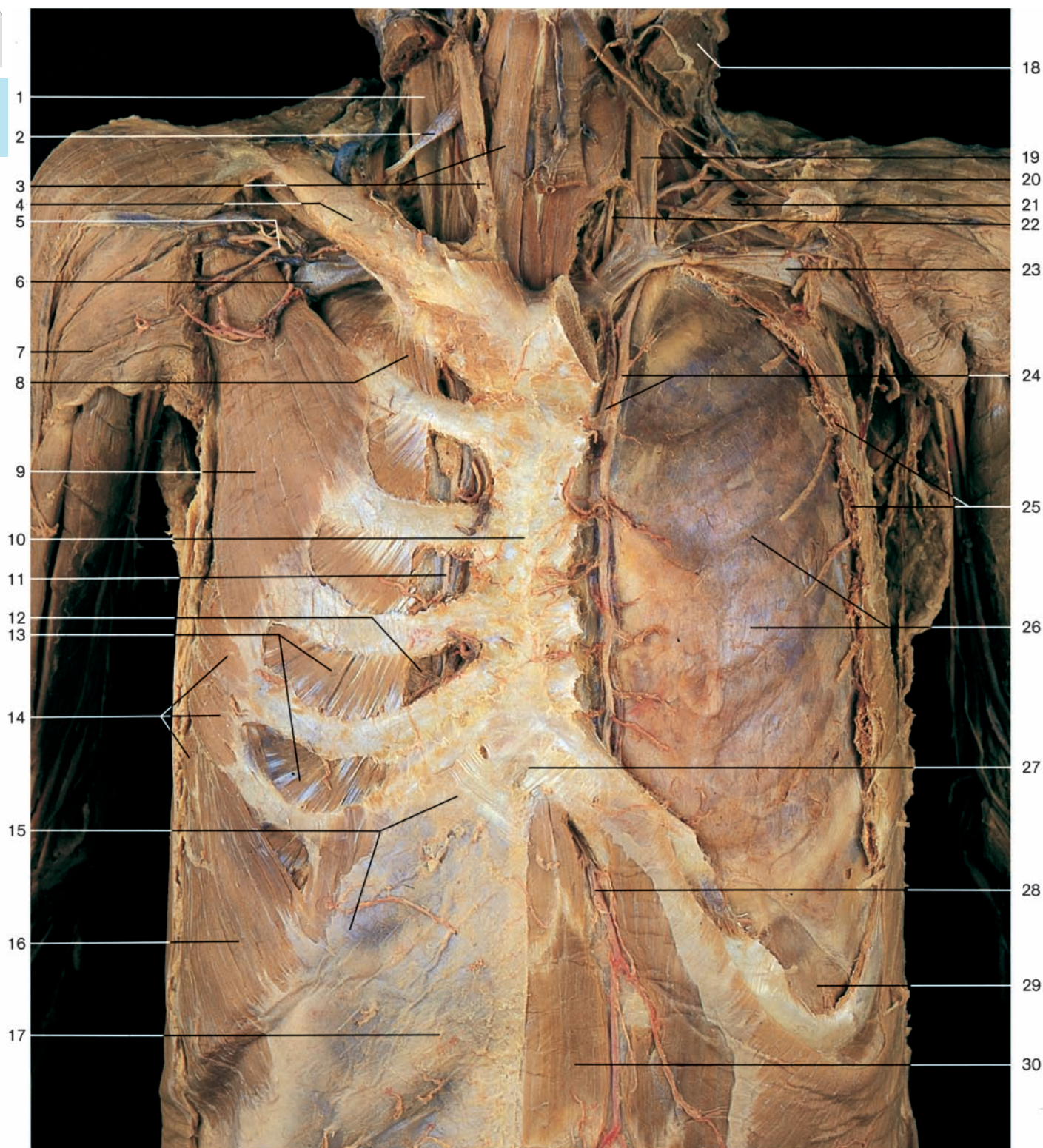
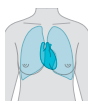


- 1 Internal jugular vein and right common carotid artery
- 2 Right and left brachiocephalic vein
- 3 Aortic arch
- 4 Superior vena cava
- 5 Foramen ovale
- 6 Inferior vena cava
- 7 Ductus venosus
- 8 Liver
- 9 Umbilical vein
- 10 Small intestine
- 11 Umbilical artery
- 12 Urachus
- 13 Trachea and left internal jugular vein
- 14 Left pulmonary artery
- 15 Ductus arteriosus (Botalli)
- 16 Right ventricle
- 17 Hepatic arteries (red) and portal vein (blue)
- 18 Stomach
- 19 Urinary bladder
- 20 Portal vein
- 21 Pulmonary veins
- 22 Descending aorta
- 23 Placenta

Thoracic and abdominal organs in the newborn (anterior aspect). The right atrium has been opened to show the foramen ovale. The left lobe of the liver has been removed.

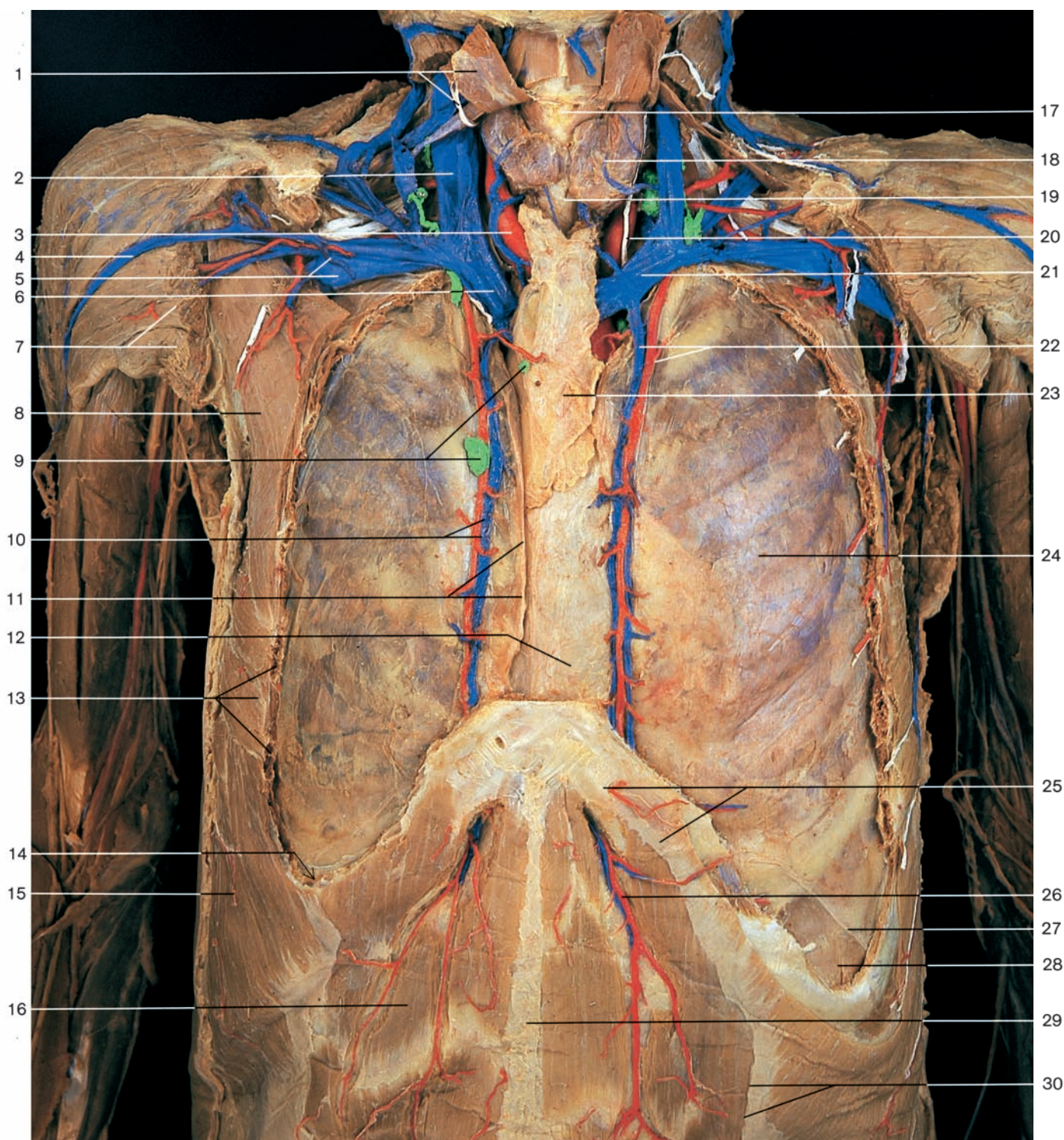


◁ **Fetal circulatory system.**
The oxygen gradient is indicated by color.



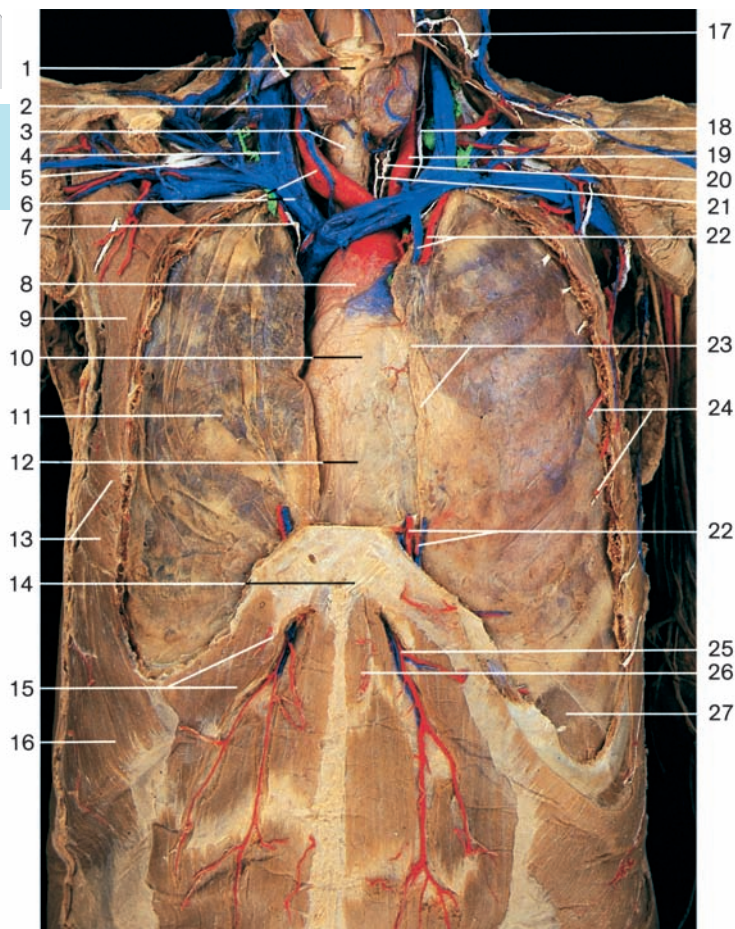
Thoracic organs (anterior aspect). The left clavicle and ribs have been partially removed, and the right intercostal spaces have been opened to show the internal thoracic vein and artery.

- | | | |
|--|---|---|
| 1 Right internal jugular vein | 11 Right internal thoracic artery and vein | 21 Brachial plexus |
| 2 Omohyoid muscle | 12 Fascicles of transversus thoracis muscle | 22 Vagus nerve |
| 3 Sternohyoid muscle and external jugular vein | 13 Internal intercostal muscles | 23 Left axillary vein |
| 4 Clavicle | 14 Serratus anterior muscle | 24 Left internal thoracic artery and vein |
| 5 Thoraco-acromial artery | 15 Costal margin | 25 Ribs and thoracic wall (cut) |
| 6 Right subclavian vein | 16 External abdominal oblique muscle | 26 Costal pleura |
| 7 Pectoralis major muscle | 17 Anterior sheath of rectus abdominis muscle | 27 Xiphoid process |
| 8 External intercostal muscle | 18 Sternocleidomastoid muscle | 28 Superior epigastric artery |
| 9 Pectoralis minor muscle | 19 Left internal jugular vein | 29 Diaphragm |
| 10 Body of sternum | 20 Transverse cervical artery | 30 Rectus abdominis muscle |



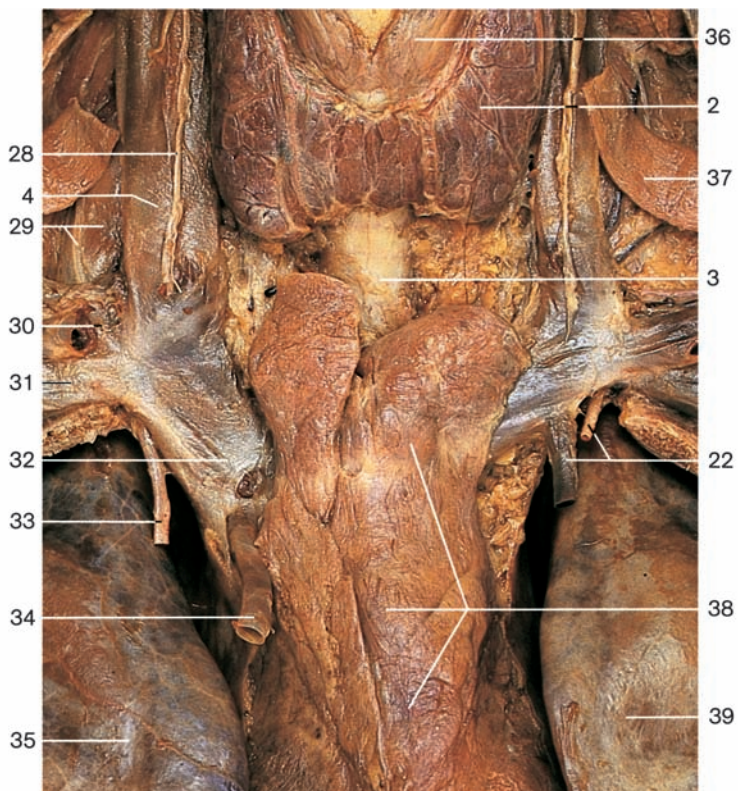
Thoracic organs (anterior aspect). Ribs, clavicle, and sternum have been partly removed to show anterior mediastinum and pleura. Red = arteries; blue = veins; green = lymph vessels and nodes.

- | | | |
|--|--|---|
| 1 Sternothyroid muscle and its nerve (a branch of the ansa cervicalis) | 11 Anterior margin of costal pleura | 21 Left brachiocephalic vein |
| 2 Right internal jugular vein | 12 Pericardium | 22 Left internal thoracic artery and vein |
| 3 Right common carotid artery | 13 Fifth and sixth ribs (divided) and serratus anterior muscle | 23 Thymus |
| 4 Cephalic vein | 14 Costodiaphragmatic recess | 24 Costal pleura |
| 5 Right subclavian vein | 15 External abdominal oblique muscle | 25 Costal margin |
| 6 Right brachiocephalic vein | 16 Rectus abdominis muscle | 26 Superior epigastric artery |
| 7 Pectoralis major muscle (divided) | 17 Larynx (thyroid cartilage) | 27 Margin of costal pleura |
| 8 Pectoralis minor muscle (divided) | 18 Thyroid gland | 28 Diaphragm |
| 9 Parasternal lymph nodes | 19 Trachea | 29 Linea alba |
| 10 Internal thoracic artery and vein | 20 Left vagus nerve | 30 Cut edge of anterior sheath of rectus abdominis muscle |



Thoracic organs (anterior aspect). The internal thoracic vessels have been removed, and the anterior margins of the pleura and lungs have been slightly reflected to display the anterior and middle mediastinum, including the heart and great vessels. Red = arteries; blue = veins; green = lymph vessels and nodes.

- 1 Larynx (thyroid cartilage)
- 2 Thyroid gland
- 3 Trachea
- 4 Internal jugular vein
- 5 Brachial plexus
- 6 Right brachiocephalic vein and common carotid artery
- 7 Right phrenic nerve
- 8 Ascending aorta
- 9 Pectoralis minor muscle (divided)
- 10 Pulmonary trunk (covered by pericardium)
- 11 Costal pleura
- 12 Pericardium and heart
- 13 Serratus anterior muscle
- 14 Xiphoid process
- 15 Costal margin
- 16 External abdominal oblique muscle
- 17 Sternothyroid muscle (divided and reflected)
- 18 Vagus nerve
- 19 Left common carotid artery
- 20 Left sympathetic trunk
- 21 Left recurrent laryngeal nerve
- 22 Left internal thoracic artery and vein (divided)
- 23 Margin of costal pleura
- 24 Intercostal nerves and vessels
- 25 Superior epigastric artery
- 26 Rectus abdominis muscle
- 27 Diaphragm
- 28 Ansa cervicalis
- 29 Phrenic nerve and anterior scalene muscle
- 30 External jugular vein (divided)
- 31 Right subclavian vein
- 32 Right brachiocephalic vein
- 33 Internal thoracic artery (divided)
- 34 Internal thoracic vein (divided)
- 35 Right lung
- 36 Cricothyroid muscle
- 37 Omohyoid muscle
- 38 Thymus
- 39 Left lung

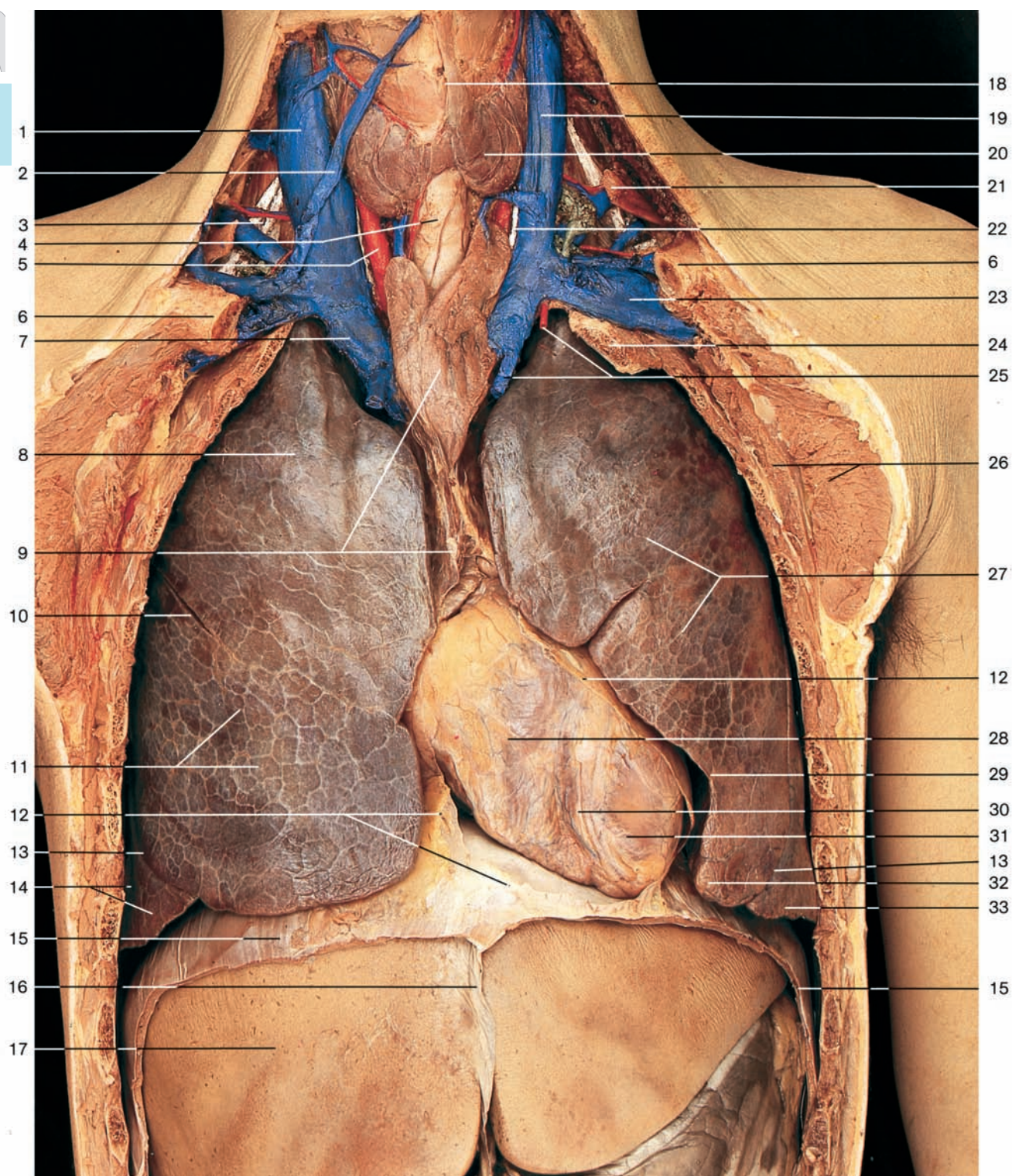
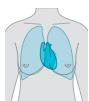


Thoracic organs (anterior aspect, enlarged details). The position (above the heart) and size of the thymus are shown.



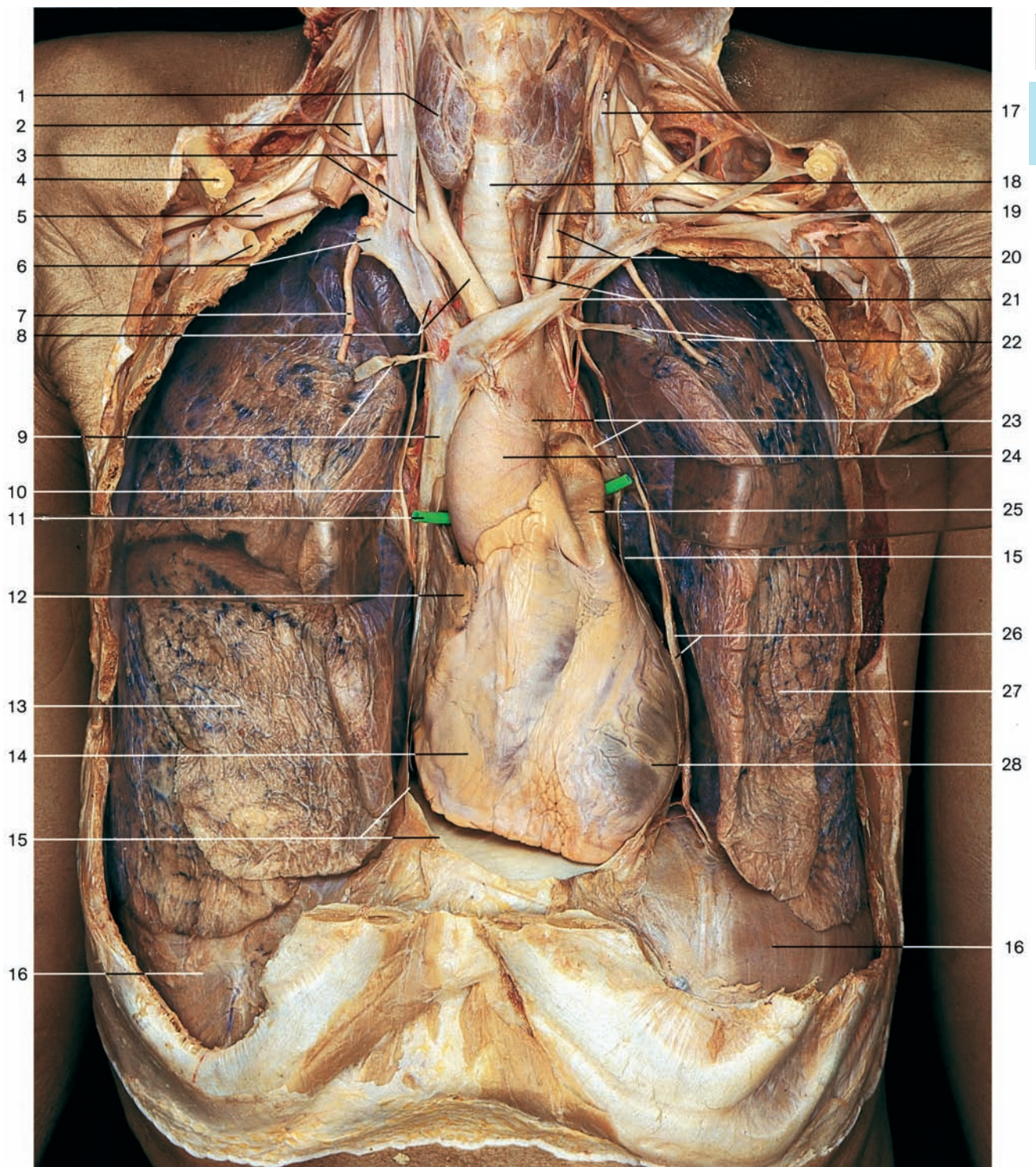
Thoracic organs (anterior aspect). The pleura has been opened and the lungs exposed. Remnants of the thymus and pericardium are seen.

- | | | |
|--|----------------------------------|--|
| 1 Right internal jugular vein | 11 Middle lobe of right lung | 20 Left common carotid artery and vagus nerve |
| 2 Phrenic nerve and anterior scalene muscle | 12 Oblique fissure of right lung | 21 Left brachiocephalic vein |
| 3 Clavicle (divided) | 13 Lower lobe of right lung | 22 Internal thoracic artery and vein (divided) |
| 4 Right subclavian artery and vein | 14 Xiphoid process | 23 Ascending aorta and aortic arch |
| 5 Internal thoracic artery | 15 Diaphragm | 24 Upper lobe of left lung |
| 6 Right brachiocephalic vein | 16 Thyroid gland | 25 Pericardium |
| 7 Brachiocephalic trunk | 17 Left internal jugular vein | 26 Oblique fissure of left lung |
| 8 Thymus (atrophic) | 18 Brachial plexus | 27 Lower lobe of left lung |
| 9 Upper lobe of right lung | 19 Left cephalic vein | 28 Costal margin |
| 10 Horizontal fissure of right lung (incomplete) | | |



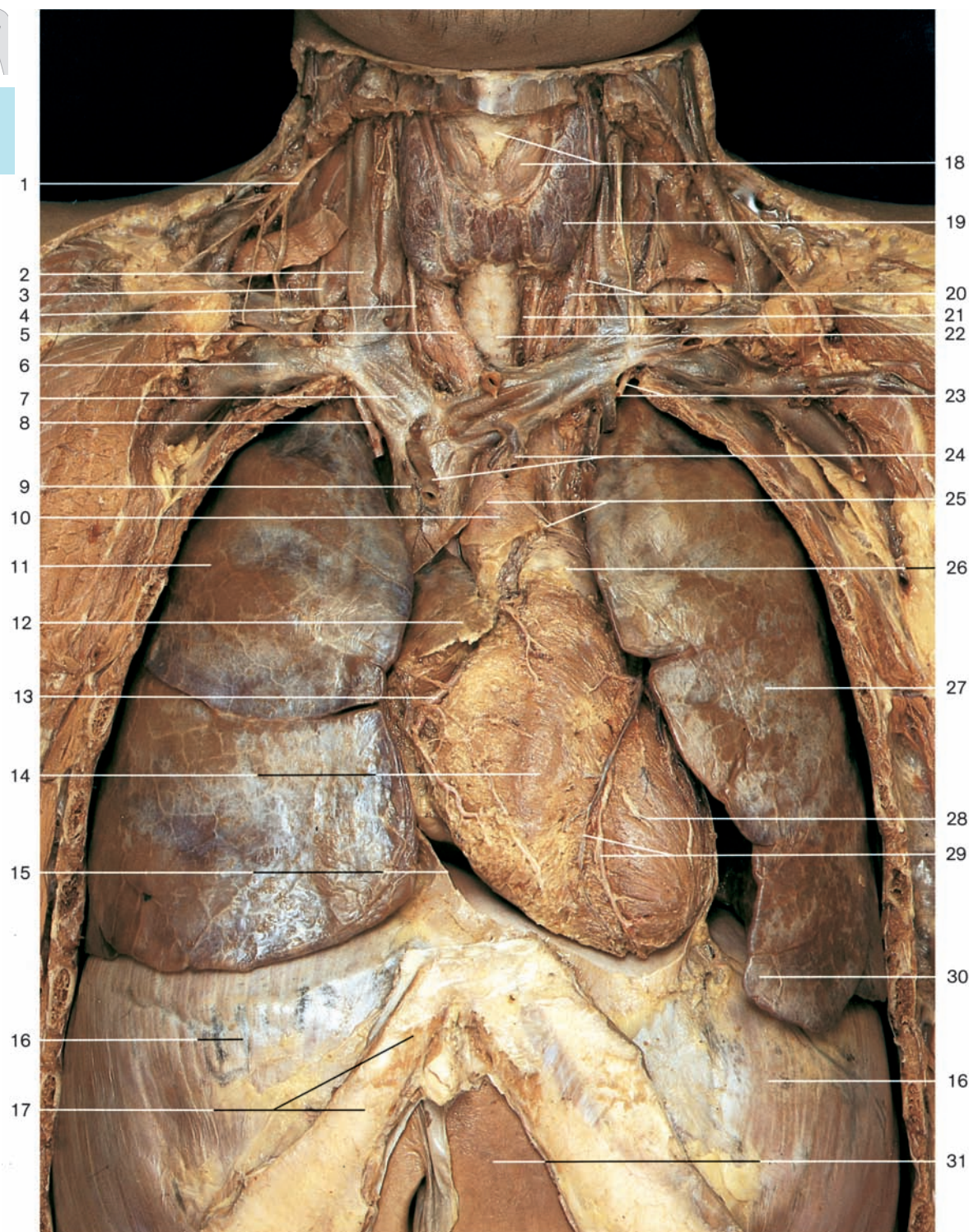
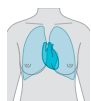
Thoracic organs (anterior aspect). The thoracic wall, costal pleura, pericardium, and diaphragm have been partly removed. Red = arteries; blue = veins.

- | | | |
|--|-------------------------------|--|
| 1 Internal jugular vein | 13 Oblique fissure of lung | 25 Internal thoracic artery and vein |
| 2 External jugular vein (displaced medially) | 14 Lower lobe of right lung | 26 Pectoralis major and pectoralis minor muscles (cut edges) |
| 3 Brachial plexus | 15 Diaphragm | 27 Upper lobe of left lung |
| 4 Trachea | 16 Falciform ligament | 28 Right ventricle |
| 5 Right common carotid artery | 17 Liver | 29 Cardiac notch of left lung |
| 6 Clavicle (divided) | 18 Location of larynx | 30 Interventricular sulcus of heart |
| 7 Right brachiocephalic vein | 19 Left internal jugular vein | 31 Left ventricle |
| 8 Upper lobe of right lung | 20 Thyroid gland | 32 Lingula |
| 9 Thymus (atrophic) | 21 Omohyoid muscle (divided) | 33 Lower lobe of left lung |
| 10 Horizontal fissure of right lung | 22 Vagus nerve | |
| 11 Middle lobe of right lung | 23 Left subclavian vein | |
| 12 Pericardium (cut edges) | 24 First rib (divided) | |



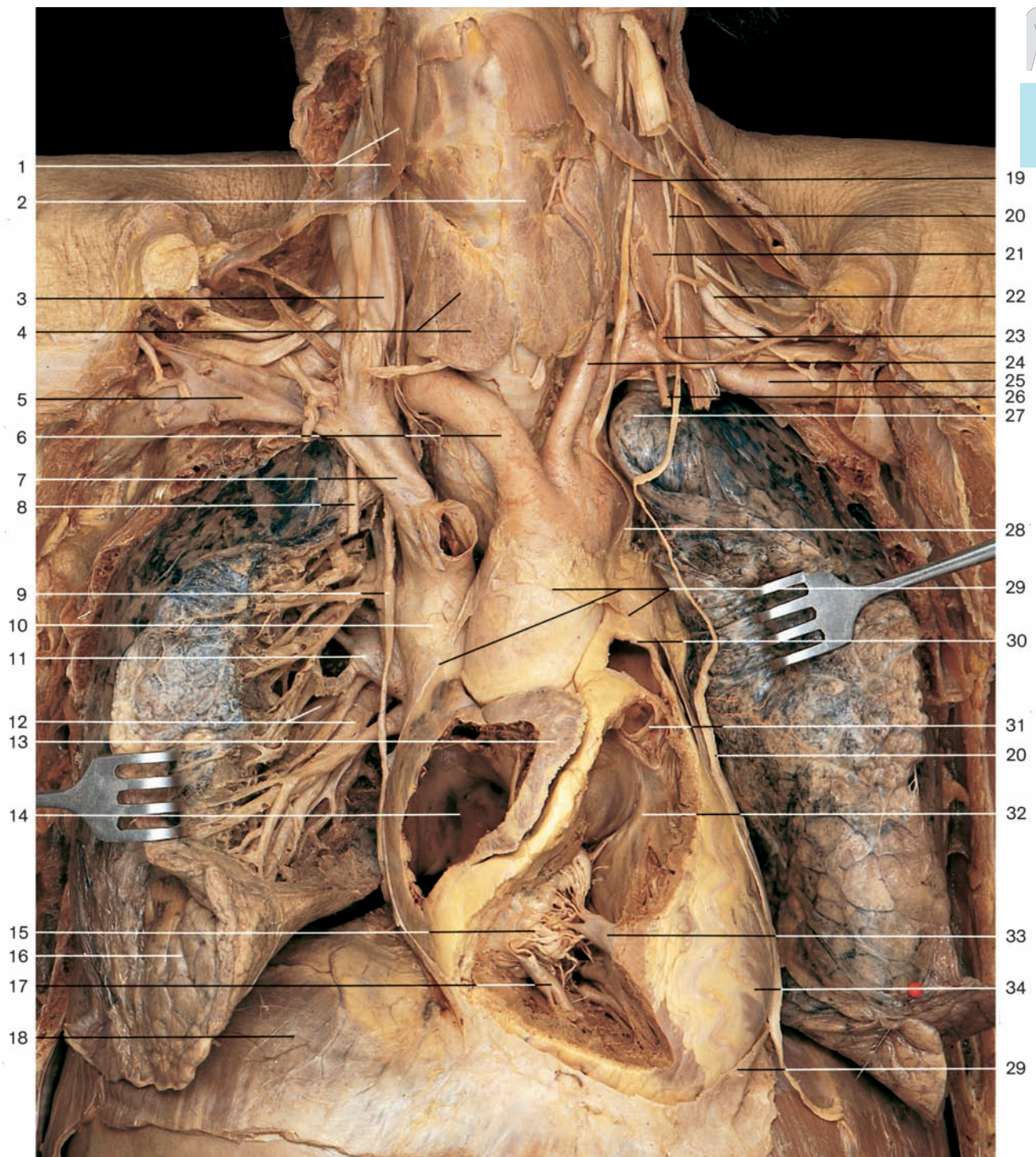
Thoracic organs (anterior aspect). Position of the heart and middle mediastinum. The anterior wall of the thorax, the costal pleura, and the pericardium have been removed and the lungs slightly reflected.

- | | | |
|--|---|--|
| 1 Thyroid gland | 11 Transverse pericardial sinus (probe) | 21 Left brachiocephalic vein and inferior thyroid vein |
| 2 Phrenic nerve and anterior scalene muscle | 12 Right auricle | 22 Left internal thoracic artery and vein (divided) |
| 3 Vagus nerve and internal jugular vein | 13 Middle lobe of right lung | 23 Upper margin of pericardial sac |
| 4 Clavicle (divided) | 14 Right ventricle | 24 Ascending aorta |
| 5 Brachial plexus and subclavian artery | 15 Cut edge of pericardium | 25 Pulmonary trunk |
| 6 Subclavian vein | 16 Diaphragm | 26 Left phrenic nerve and left pericardiophrenic artery and vein |
| 7 Internal thoracic artery | 17 Internal jugular vein | 27 Upper lobe of left lung |
| 8 Brachiocephalic trunk and right brachiocephalic vein | 18 Trachea | 28 Left ventricle |
| 9 Superior vena cava and thymic vein | 19 Left recurrent laryngeal nerve | |
| 10 Right phrenic nerve | 20 Left common carotid artery and vagus nerve | |



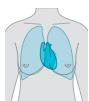
Thoracic organs (anterior aspect). Position of heart, dissection of coronary vessels in situ. The anterior wall of thorax, costal pleura, and pericardium have been removed.

- | | | |
|--------------------------------------|---|---|
| 1 Intermediate supraclavicular nerve | 13 Right coronary artery and small cardiac vein | 21 Left recurrent laryngeal nerve |
| 2 Internal jugular vein | 14 Right ventricle | 22 Trachea |
| 3 Right phrenic nerve | 15 Cut edge of pericardium | 23 Left internal thoracic artery and vein (divided) |
| 4 Right vagus nerve | 16 Diaphragm | 24 Thymic veins |
| 5 Right common carotid artery | 17 Costal margin | 25 Margin of pericardial sac |
| 6 Right subclavian vein | 18 Larynx (cricothyroid muscle and thyroid cartilage) | 26 Pulmonary trunk |
| 7 Right brachiocephalic vein | 19 Thyroid gland | 27 Left lung |
| 8 Right internal thoracic artery | 20 Left common carotid artery and left vagus nerve | 28 Left ventricle |
| 9 Superior vena cava | | 29 Anterior interventricular artery and vein |
| 10 Ascending aorta | | 30 Lingula |
| 11 Right lung | | 31 Liver |
| 12 Right atrium | | |



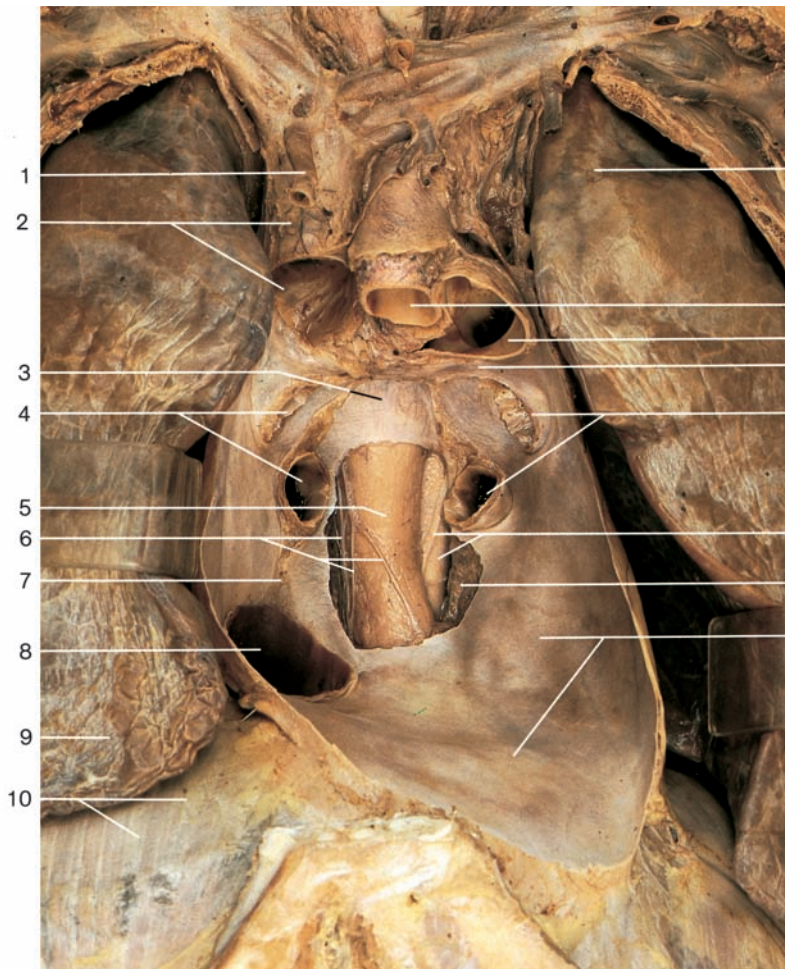
Thoracic organs (anterior aspect). Heart with valves in situ. Anterior wall of thorax, pleura, and anterior portion of pericardium have been removed. The right atrium and ventricle have been opened to show the right atrioventricular and pulmonary valves.

- | | | |
|-----------------------------------|---|-----------------------------------|
| 1 Omohyoid muscle | 13 Right auricle | 24 Left common carotid artery |
| 2 Pyramidal lobe of thyroid gland | 14 Right atrium | 25 Left subclavian artery |
| 3 Internal jugular vein | 15 Right atrioventricular (tricuspid) valve | 26 Left internal thoracic artery |
| 4 Thyroid gland | 16 Right lung | 27 Apex of left lung |
| 5 Right subclavian vein | 17 Posterior papillary muscle | 28 Left recurrent laryngeal nerve |
| 6 Brachiocephalic trunk | 18 Diaphragm | 29 Cut edge of pericardium |
| 7 Right brachiocephalic vein | 19 Left vagus nerve | 30 Pulmonary trunk (fenestrated) |
| 8 Right internal thoracic artery | 20 Left phrenic nerve | 31 Pulmonic valve |
| 9 Right phrenic nerve | 21 Anterior scalene muscle | 32 Supraventricular crest |
| 10 Superior vena cava | 22 Brachial plexus | 33 Anterior papillary muscle |
| 11 Pulmonary vein | 23 Thyrocervical trunk | 34 Left ventricle |
| 12 Branches of pulmonary artery | | |



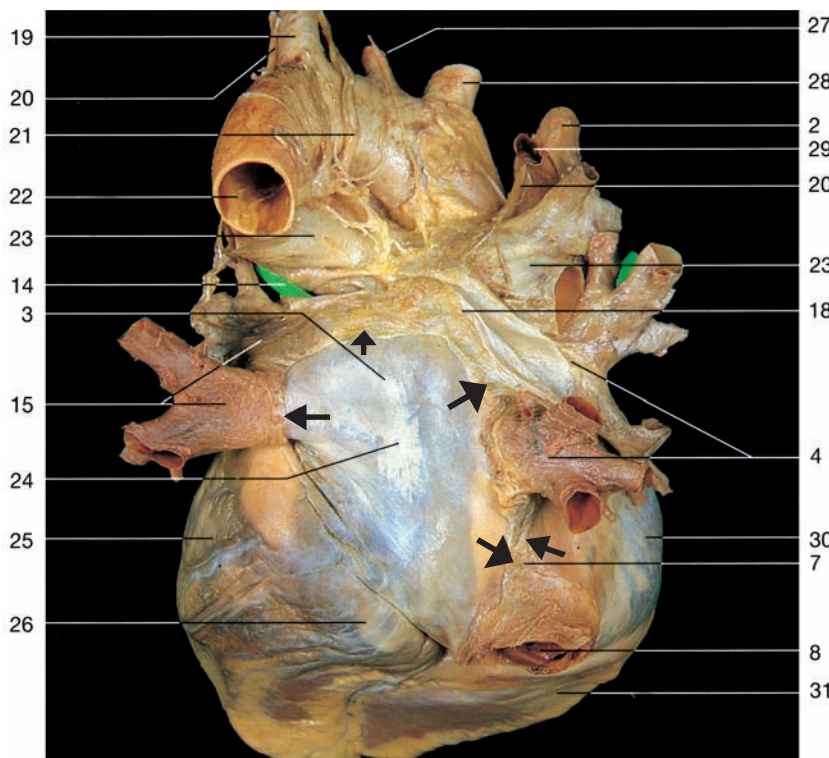
Thoracic organs (anterior aspect). Pericardium and mediastinum. Anterior wall of thorax and heart have been removed and the lungs slightly reflected. Note the probe within transverse pericardial sinus.

- | | | |
|---|--|--|
| 1 Right internal jugular vein and right vagus nerve | 12 Right phrenic nerve and right pericardiophrenic artery and vein | 22 Left common carotid artery and left vagus nerve |
| 2 Right phrenic nerve and anterior scalene muscle | 13 Right pulmonary veins | 23 Left internal thoracic artery and vein (divided) |
| 3 Right common carotid artery | 14 Oblique sinus of pericardium | 24 Vagus nerve at aortic arch |
| 4 Brachial plexus | 15 Inferior vena cava | 25 Cut edge of pericardium |
| 5 Right subclavian artery and vein | 16 Diaphragmatic part of pericardium | 26 Ascending aorta |
| 6 Right brachiocephalic vein | 17 Diaphragm | 27 Pulmonary trunk (divided) |
| 7 Right internal thoracic artery (divided) | 18 Costal margin | 28 Left pulmonary veins |
| 8 Brachiocephalic trunk | 19 Thyroid gland | 29 Left phrenic nerve and left pericardiophrenic artery and vein |
| 9 Upper lobe of right lung | 20 Trachea | 30 Contour of esophagus beneath pericardium |
| 10 Superior vena cava | 21 Left recurrent laryngeal nerve and inferior thyroid vein | 31 Contour of aorta beneath pericardium |
| 11 Transverse pericardial sinus (probe) | | 32 Pericardium (cut edge) |

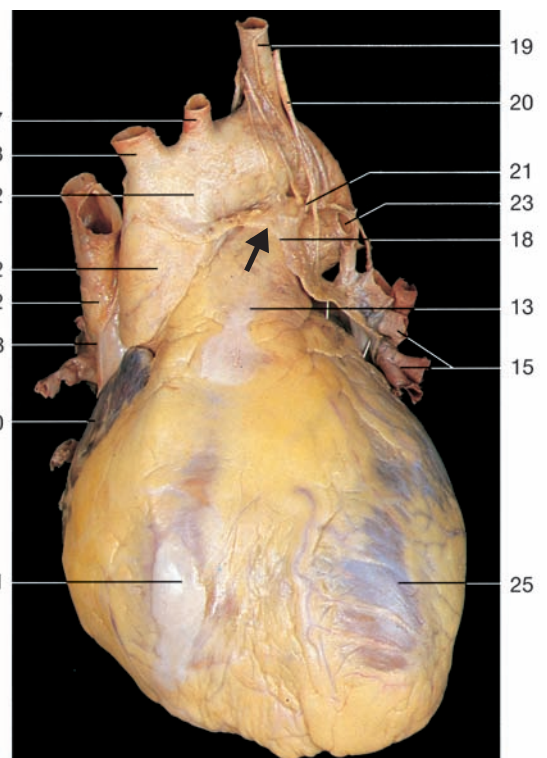


- 1 Internal thoracic vein
- 2 Superior vena cava
- 3 Oblique sinus of pericardium
- 4 Right pulmonary veins
- 5 Esophagus
- 6 Branches of right vagus nerve
- 7 Mesocardium
- 8 Inferior vena cava
- 9 Middle lobe of right lung
- 10 Diaphragm
- 11 Upper lobe of left lung
- 12 Ascending aorta
- 13 Pulmonary trunk
- 14 Transverse pericardial sinus
- 15 Left pulmonary veins
- 16 Descending aorta and left vagus nerve
- 17 Left lung (adjacent to pericardium)
- 18 Pericardium
- 19 Left subclavian artery
- 20 Vagus nerve
- 21 Left recurrent laryngeal nerve
- 22 Descending aorta
- 23 Pulmonary artery
- 24 Left atrium
- 25 Left ventricle
- 26 Coronary sinus
- 27 Left common carotid artery
- 28 Brachiocephalic trunk
- 29 Azygos arch
- 30 Right atrium
- 31 Right ventricle
- 32 Aortic arch

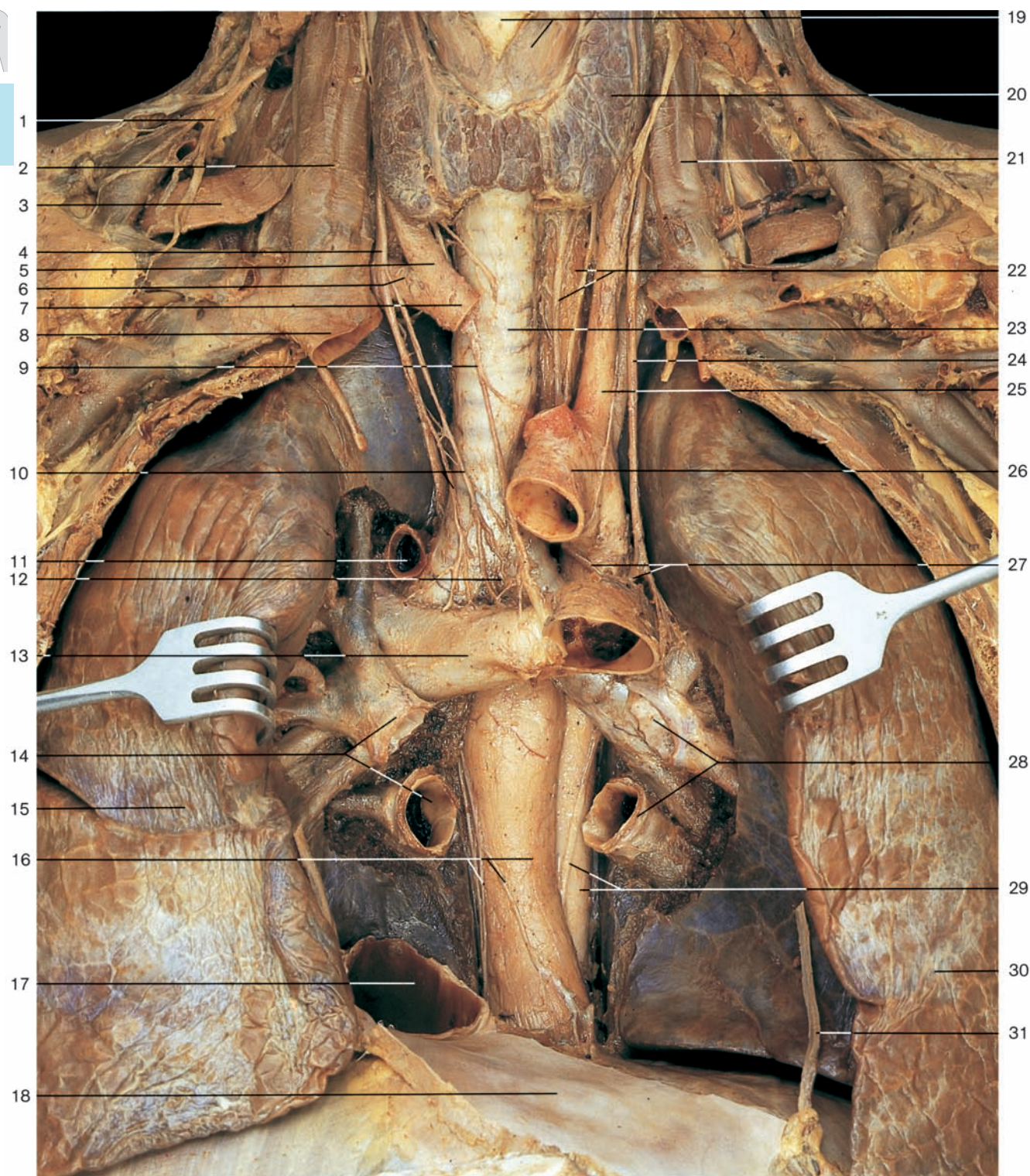
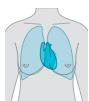
Pericardial sac (anterior aspect). The heart has been removed, and the posterior wall of the pericardium has been opened to show the adjacent esophagus and aorta.



Heart with epicardium (posterior aspect). Arrows: oblique sinus.

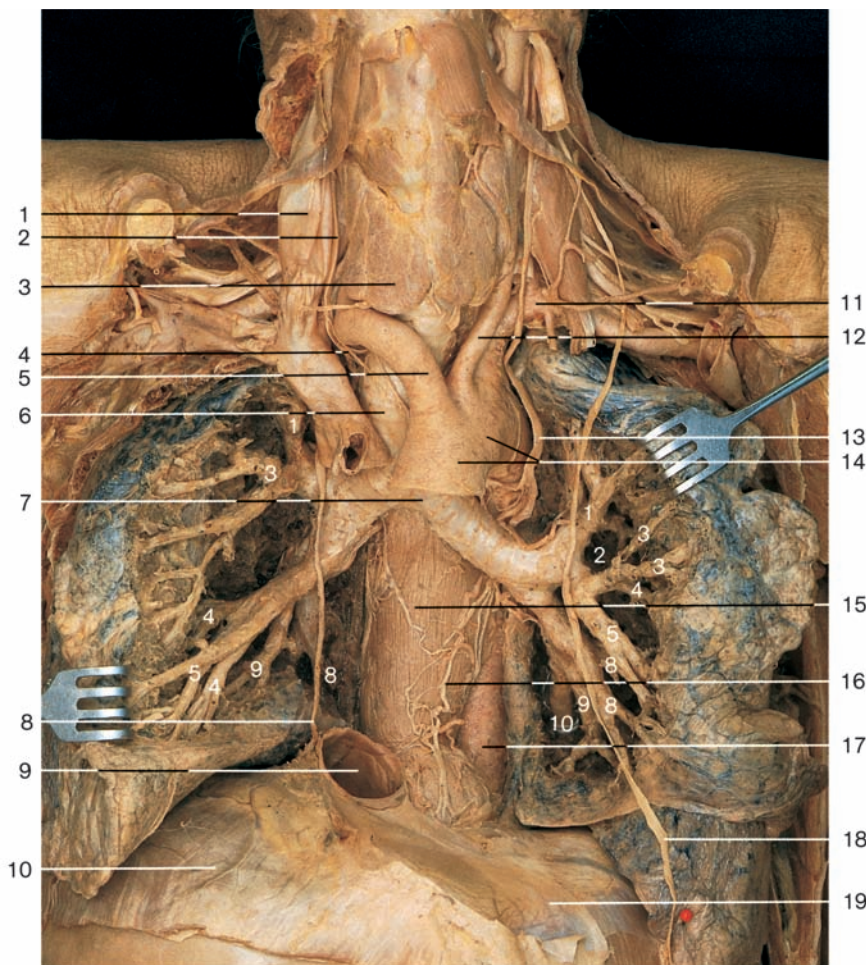


Heart with epicardium (anterior aspect). Arrow: pericardial reflection.



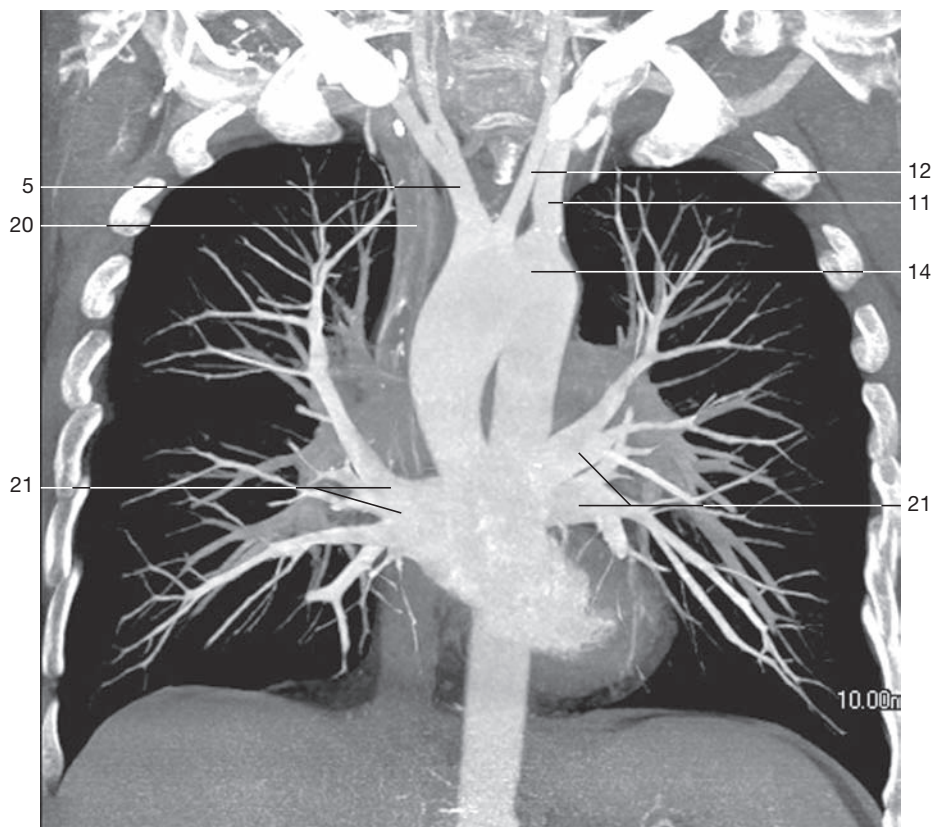
Mediastinal organs (anterior aspect). Heart and pericardium have been removed. Both lungs have been slightly reflected.

- | | | |
|--|--|--|
| 1 Supraclavicular nerves | 11 Azygos arch (divided) | 22 Esophagus and left recurrent laryngeal nerve |
| 2 Internal jugular vein | 12 Bifurcation of trachea | 23 Trachea |
| 3 Omohyoid muscle | 13 Right pulmonary artery | 24 Left vagus nerve |
| 4 Right vagus nerve | 14 Right pulmonary veins | 25 Left common carotid artery |
| 5 Right common carotid artery | 15 Right lung | 26 Aortic arch |
| 6 Right subclavian artery | 16 Esophagus and branches of right vagus nerve | 27 Left recurrent laryngeal nerve branching off from vagus nerve |
| 7 Brachiocephalic trunk | 17 Inferior vena cava | 28 Left pulmonary veins |
| 8 Right brachiocephalic vein | 18 Pericardium | 29 Thoracic aorta and left vagus nerve |
| 9 Superior cervical cardiac branch of vagus nerve | 19 Larynx (thyroid cartilage, cricothyroid muscle) | 30 Left lung |
| 10 Inferior cervical cardiac branches of vagus nerve | 20 Thyroid gland | 31 Left phrenic nerve (divided) |
| | 21 Internal jugular vein | |

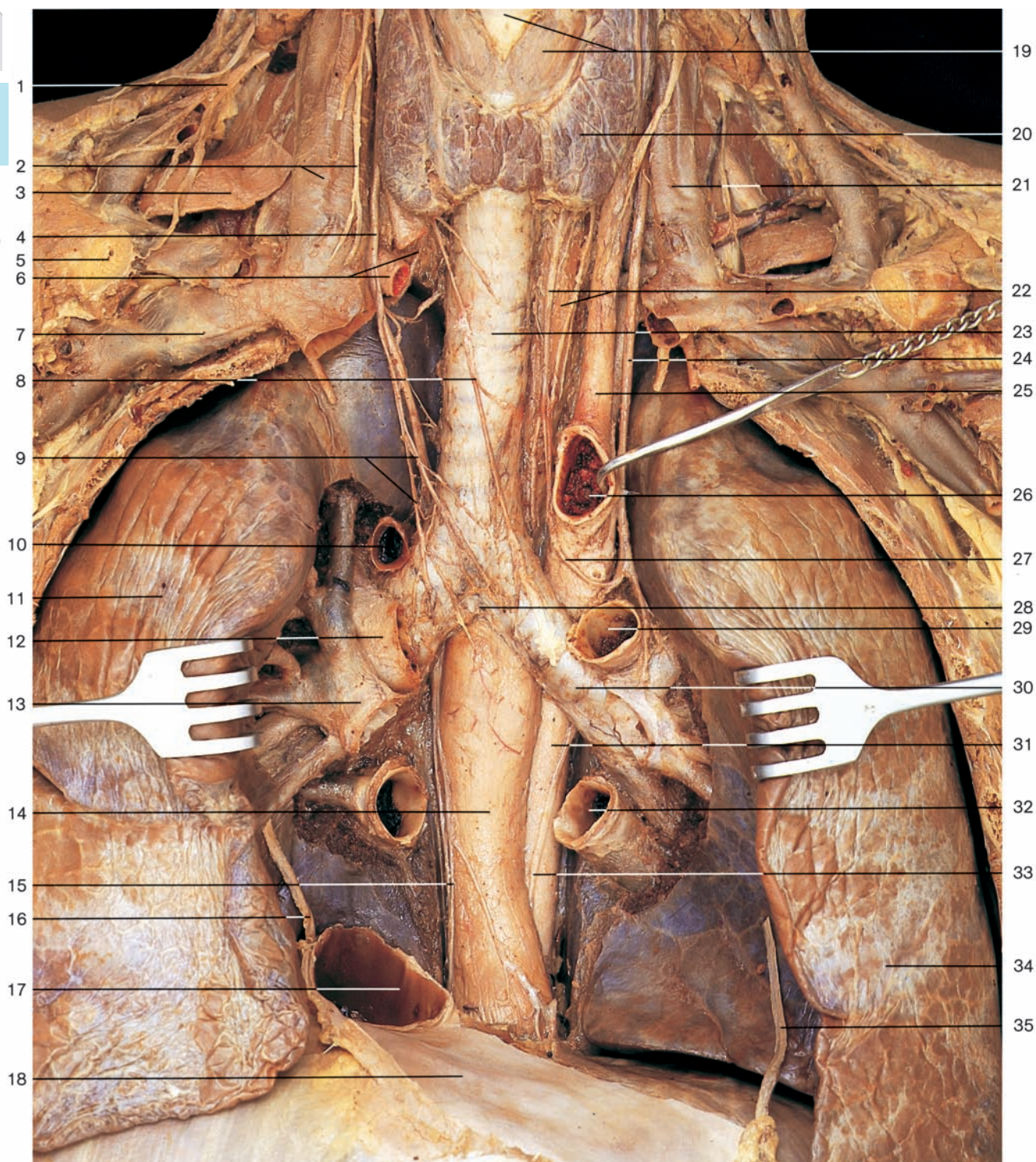
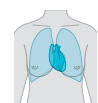


- 1 Internal jugular vein
- 2 Right vagus nerve
- 3 Thyroid gland
- 4 Right recurrent laryngeal nerve
- 5 Brachiocephalic trunk
- 6 Trachea
- 7 Bifurcation of trachea
- 8 Right phrenic nerve
- 9 Inferior vena cava
- 10 Diaphragm
- 11 Left subclavian artery
- 12 Left common carotid artery
- 13 Left vagus nerve
- 14 Aortic arch
- 15 Esophagus
- 16 Esophageal plexus
- 17 Thoracic aorta
- 18 Left phrenic nerve
- 19 Pericardium at the central tendon of diaphragm
- 20 Superior vena cava
- 21 Pulmonary veins and left atrium

Bronchial tree in situ (anterior aspect). Heart and pericardium have been removed. The bronchi of the bronchopulmonary segments are dissected. 1–10 = numbers of segments (compare with pages 254, 255, and 259).

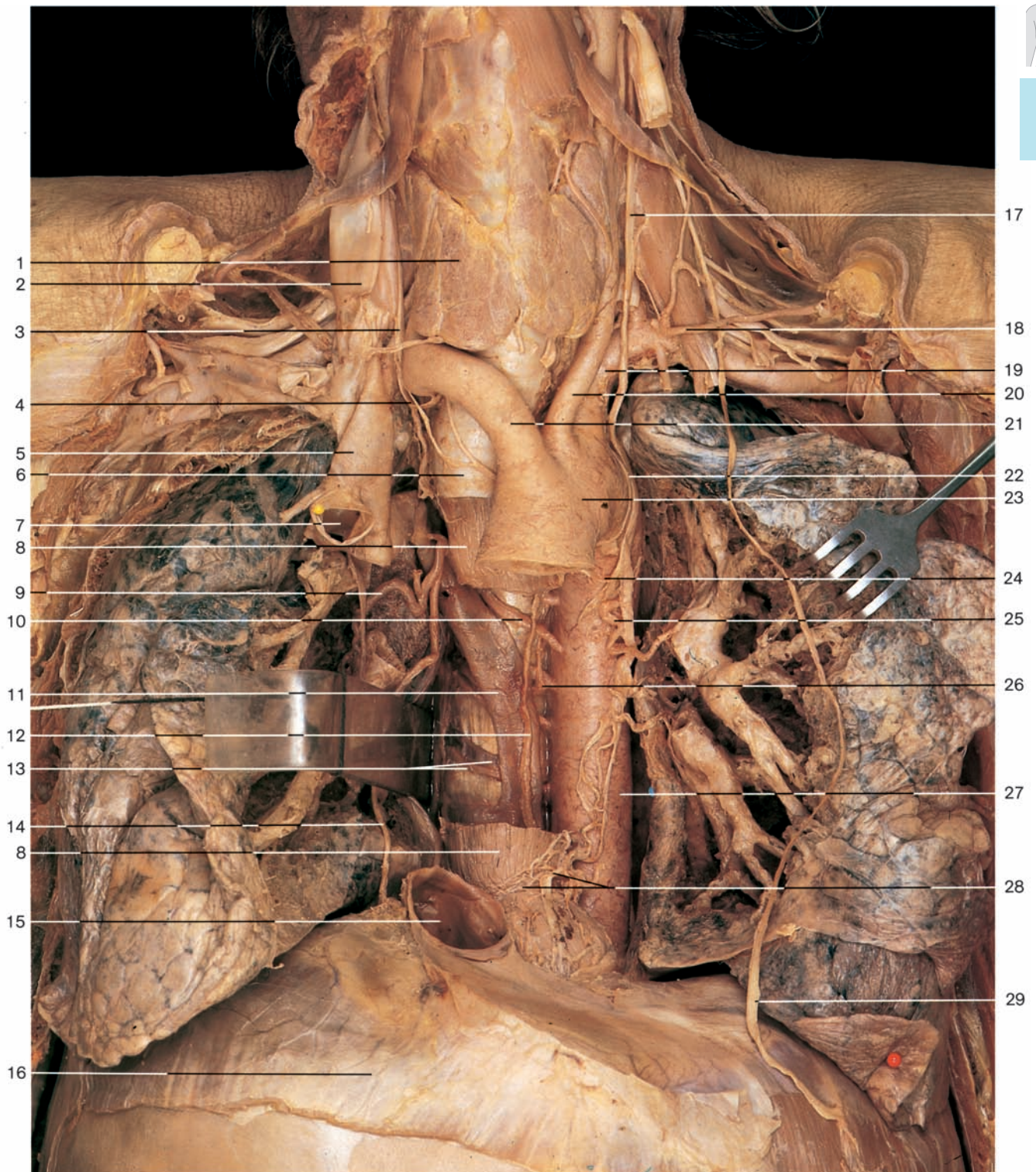


Frontal section through the thoracic cavity showing the mediastinal vessels (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



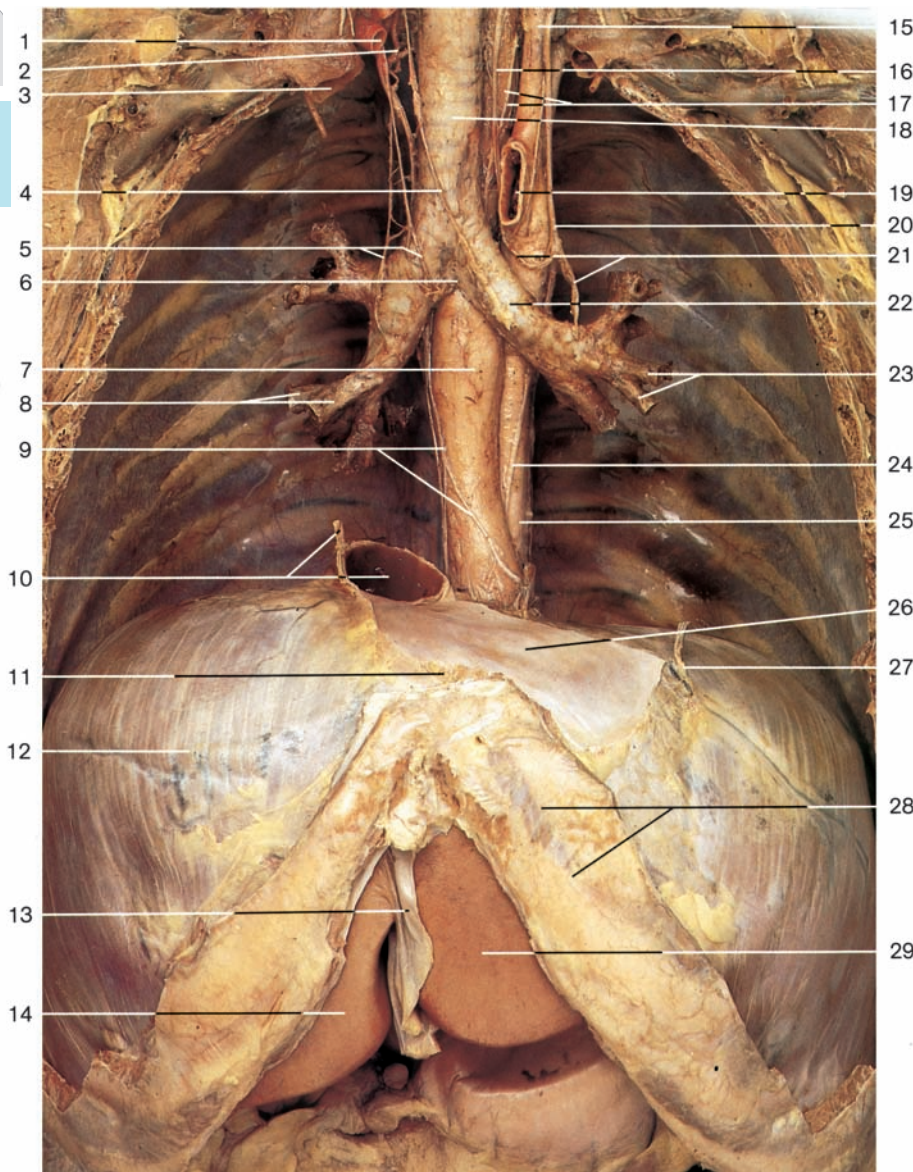
Mediastinal organs (anterior aspect). The heart with the pericardium has been removed, and the lungs and aortic arch have been slightly reflected to show the vagus nerves and their branches.

- | | | |
|---|---|-----------------------------------|
| 1 Supraclavicular nerves | 12 Right pulmonary artery | 24 Left vagus nerve |
| 2 Right internal jugular vein with ansa cervicalis | 13 Right pulmonary veins | 25 Left common carotid artery |
| 3 Omohyoid muscle | 14 Esophagus | 26 Aortic arch |
| 4 Right vagus nerve | 15 Esophageal plexus | 27 Left recurrent laryngeal nerve |
| 5 Clavicle | 16 Right phrenic nerve (divided) | 28 Bifurcation of trachea |
| 6 Right subclavian artery and recurrent laryngeal nerve | 17 Inferior vena cava | 29 Left pulmonary artery |
| 7 Right subclavian vein | 18 Pericardium covering the diaphragm | 30 Left primary bronchus |
| 8 Superior cervical cardiac branch of vagus nerve | 19 Larynx (thyroid cartilage and cricothyroid muscle) | 31 Descending aorta |
| 9 Inferior cervical cardiac branch of vagus nerve | 20 Thyroid gland | 32 Left pulmonary veins |
| 10 Azygos arch (divided) | 21 Left internal jugular vein | 33 Branch of left vagus nerve |
| 11 Right lung | 22 Esophagus and left recurrent laryngeal nerve | 34 Left lung |
| | 23 Trachea | 35 Left phrenic nerve (divided) |

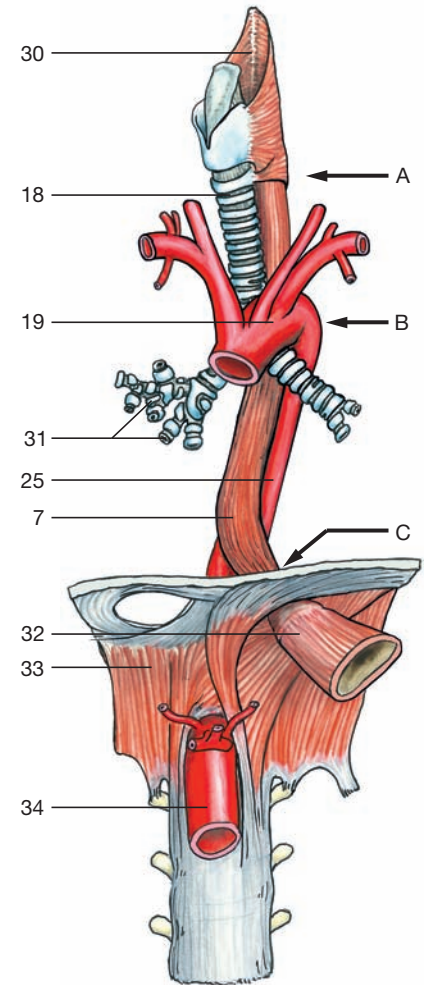


Mediastinal organs (anterior aspect). Heart and distal part of esophagus have been removed to display the vessels and nerves of the posterior mediastinum.

- | | | |
|---|--|-----------------------------------|
| 1 Thyroid gland | 11 Azygos vein | 21 Brachiocephalic trunk |
| 2 Right internal jugular vein | 12 Thoracic duct | 22 Left vagus nerve |
| 3 Right vagus nerve | 13 Posterior intercostal artery and vein
(in front of the vertebral column) | 23 Aortic arch |
| 4 Point where right recurrent laryngeal nerve
is branching off the vagus nerve | 14 Right phrenic nerve | 24 Left recurrent laryngeal nerve |
| 5 Right brachiocephalic vein | 15 Inferior vena cava | 25 Left bronchial artery |
| 6 Trachea | 16 Diaphragm | 26 Lymph node |
| 7 Left brachiocephalic vein (reflected) | 17 Left vagus nerve | 27 Thoracic aorta |
| 8 Esophagus | 18 Thyrocervical trunk | 28 Esophageal plexus |
| 9 Right bronchial artery | 19 Left subclavian artery | 29 Left phrenic nerve |
| 10 Posterior intercostal artery | 20 Left common carotid artery | |



Posterior mediastinal organs with diaphragm (anterior aspect). Heart and lungs have been removed, the costal margin remains in place. Note the different courses of left and right vagus.

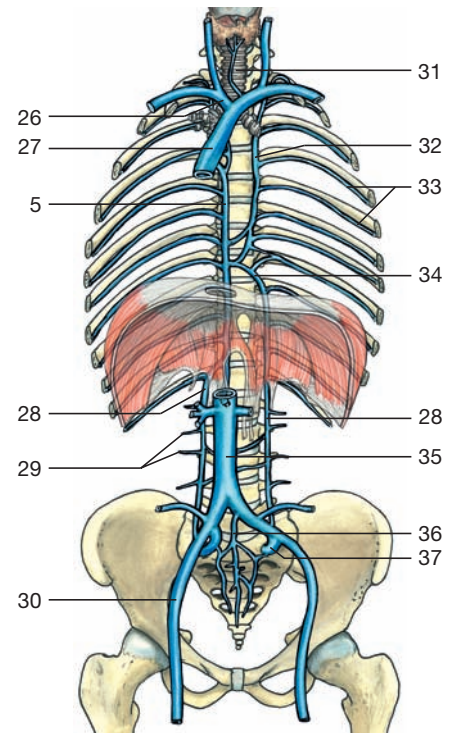


Posterior mediastinal organs with diaphragm (anterior aspect). Three regions in which the esophagus is narrowed are shown:
A = termed upper sphincter (at the level of the cricoid cartilage);
B = termed middle sphincter (at the level of the aortic arch);
C = termed lower sphincter (at the level of the diaphragm).

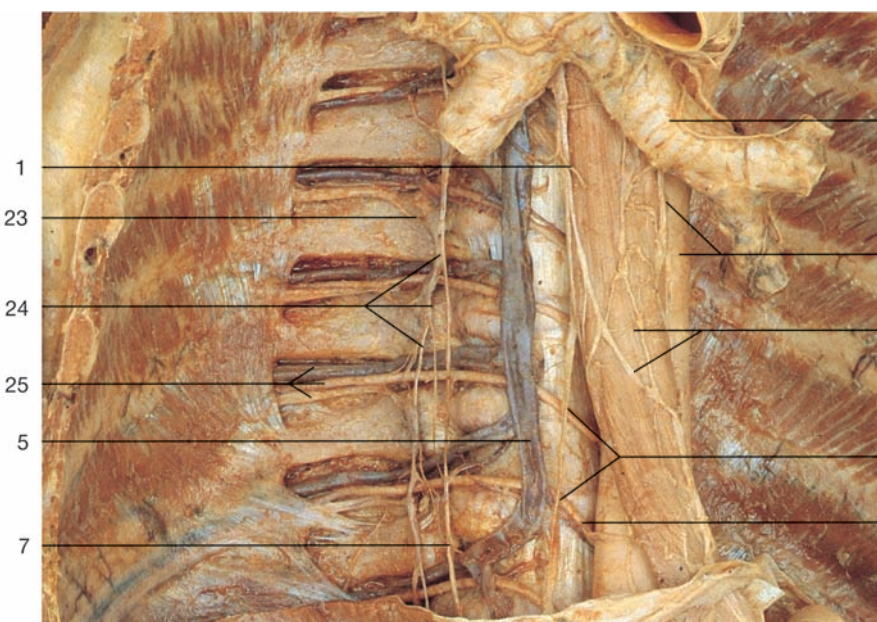
- | | | |
|---|---|---|
| 1 Right subclavian artery | 11 Sternal part of diaphragm | 23 Superior and inferior lingular bronchi |
| 2 Right recurrent laryngeal nerve | 12 Costal part of diaphragm | 24 Esophageal plexus of left vagus nerve |
| 3 Right brachiocephalic vein | 13 Falciform ligament of liver | 25 Descending aorta |
| 4 Superior cervical cardiac nerve | 14 Liver (quadrate lobe) | 26 Central tendon of diaphragm covered with pericardium |
| 5 Inferior cervical cardiac nerves and pulmonary branches | 15 Left common carotid artery | 27 Left phrenic nerve (divided) |
| 6 Bifurcation of trachea | 16 Left recurrent laryngeal nerve | 28 Costal margin |
| 7 Esophagus (thoracic part) | 17 Esophageal branches of left vagus nerve and esophagus | 29 Liver (left lobe) |
| 8 Bronchi of lateral and medial segments of middle lobe | 18 Trachea | 30 Pharynx |
| 9 Esophageal plexus and branches of right vagus nerve | 19 Aortic arch | 31 Secondary bronchi |
| 10 Inferior vena cava and right phrenic nerve (cut) | 20 Left vagus nerve | 32 Esophagus (abdominal part) |
| | 21 Left recurrent laryngeal nerve with inferior cardiac nerve | 33 Diaphragm |
| | 22 Left primary bronchus | 34 Abdominal aorta |



Posterior mediastinal organs (anterior aspect).

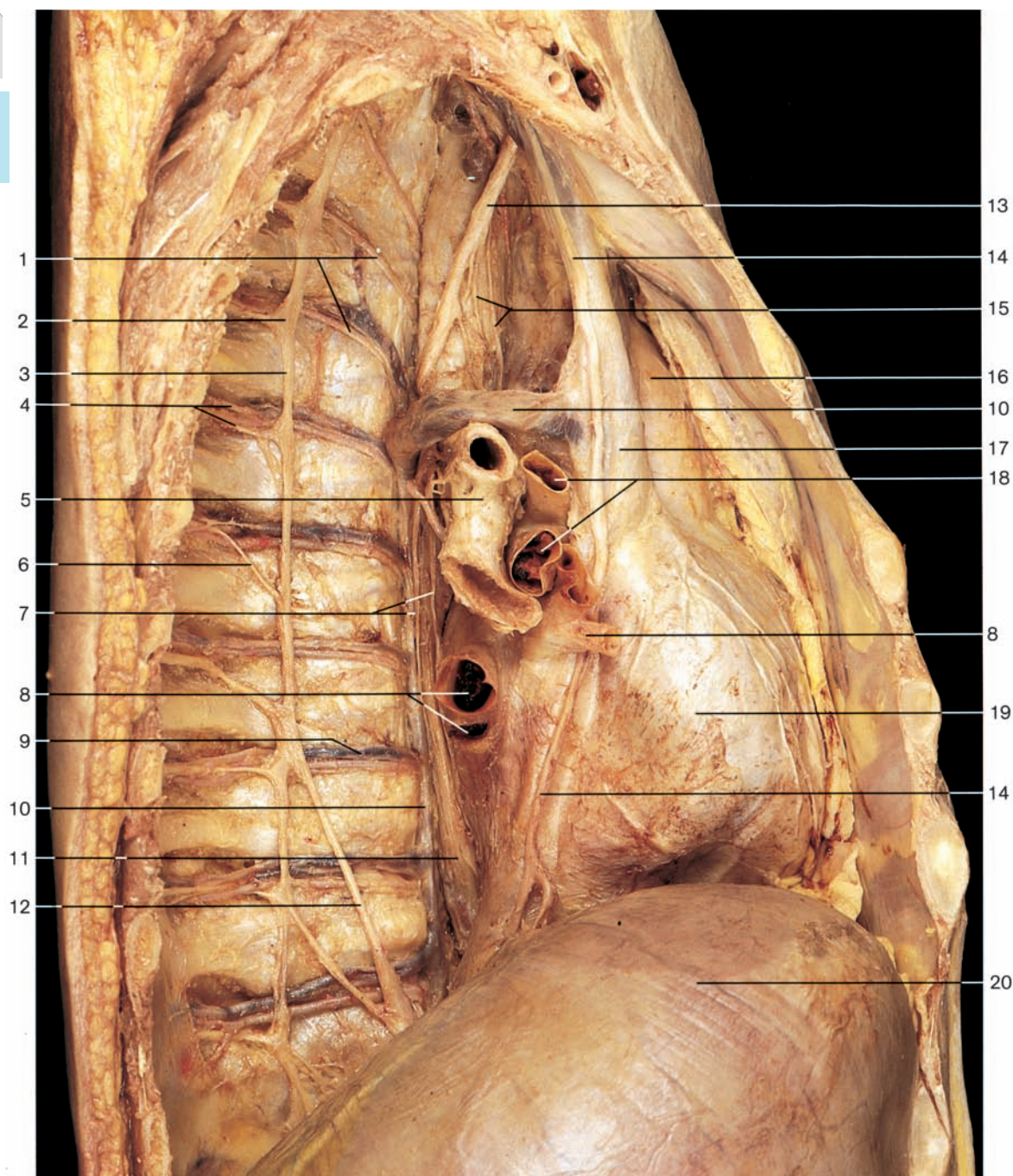
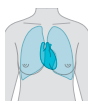


Veins of the posterior wall of thoracic and abdominal cavities (anterior aspect).



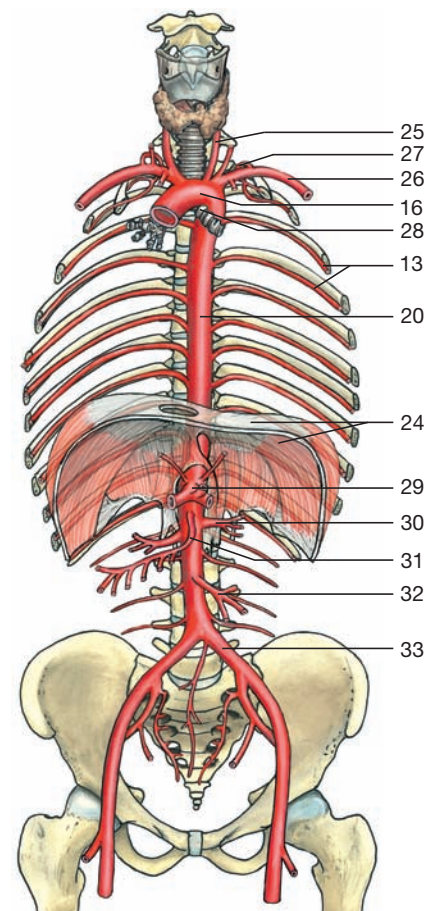
Inferior segment of posterior mediastinum (anterior aspect).

- 1 Right vagus nerve
- 2 Thyroid gland and trachea
- 3 Intercostal nerve
- 4 Aortic arch
- 5 Azygos vein
- 6 Posterior intercostal artery
- 7 Greater splanchnic nerve
- 8 Diaphragm
- 9 Liver
- 10 Proper hepatic artery and hepatic plexus
- 11 Left recurrent laryngeal nerve
- 12 Inferior cervical cardiac nerves
- 13 Left vagus nerve and left recurrent laryngeal nerve
- 14 Left primary bronchus
- 15 Thoracic aorta and left vagus nerve
- 16 Esophagus and esophageal plexus
- 17 Thoracic duct
- 18 Spleen
- 19 Anterior gastric plexus and stomach (divided)
- 20 Splenic artery and splenic plexus
- 21 Celiac trunk and celiac plexus
- 22 Pancreas
- 23 Ramus communicans
- 24 Sympathetic trunk and sympathetic ganglion
- 25 Posterior intercostal vein and artery and intercostal nerve
- 26 Right brachiocephalic vein
- 27 Superior vena cava
- 28 Ascending lumbar vein
- 29 Lumbar veins
- 30 Right external iliac vein
- 31 Trachea
- 32 Accessory hemiazygos vein
- 33 Posterior intercostal veins
- 34 Hemiazygos vein
- 35 Inferior vena cava
- 36 Median sacral vein
- 37 Internal iliac vein



Mediastinal organs (right lateral aspect). Right lung and pleura of right half of the thorax have been removed.

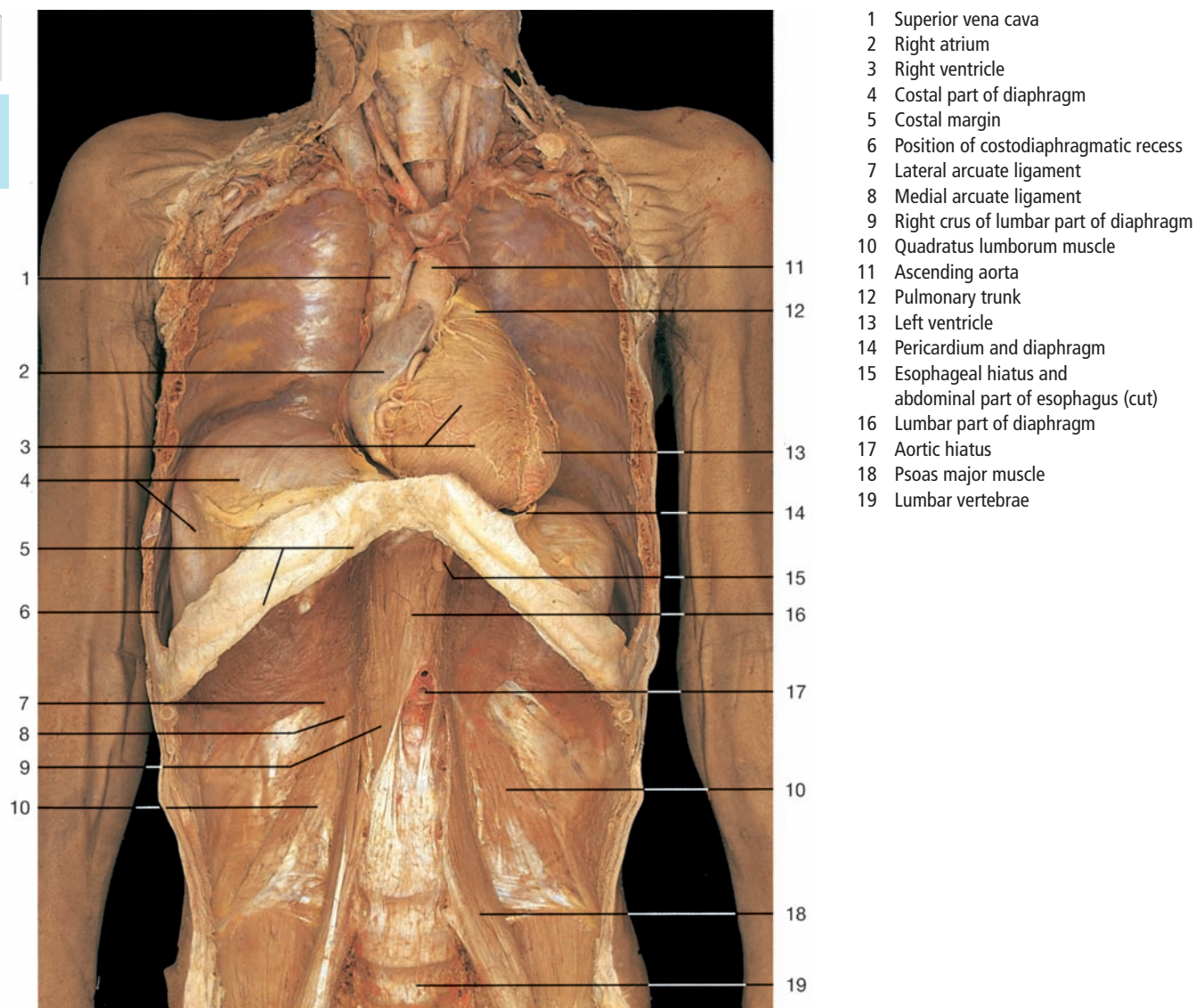
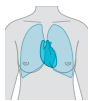
- | | | |
|---|--|---|
| 1 Posterior intercostal arteries | 7 Esophageal plexus
(branches of right vagus nerve) | 14 Right phrenic nerve |
| 2 Ganglion of sympathetic trunk | 8 Pulmonary veins | 15 Inferior cervical cardiac branches
of vagus nerve |
| 3 Sympathetic trunk | 9 Posterior intercostal vein | 16 Aortic arch |
| 4 Vessels and nerves of the intercostal space
(from above: posterior intercostal vein and
artery and intercostal nerve) | 10 Azygos vein | 17 Superior vena cava |
| 5 Right primary bronchus | 11 Esophagus | 18 Right pulmonary artery |
| 6 Ramus communicans of sympathetic trunk | 12 Greater splanchnic nerve | 19 Heart with pericardium |
| | 13 Right vagus nerve | 20 Diaphragm |



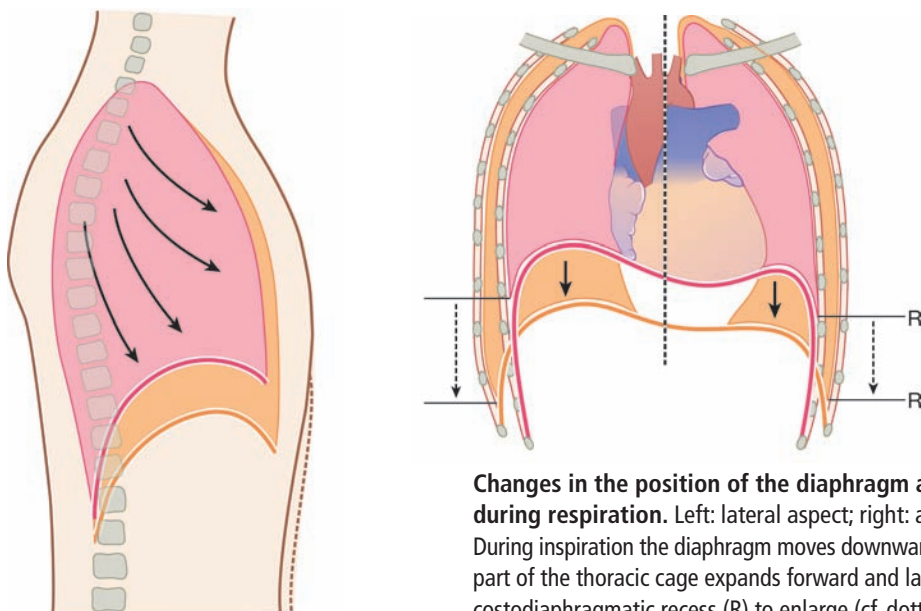
Main branches of descending aorta
(anterior aspect).

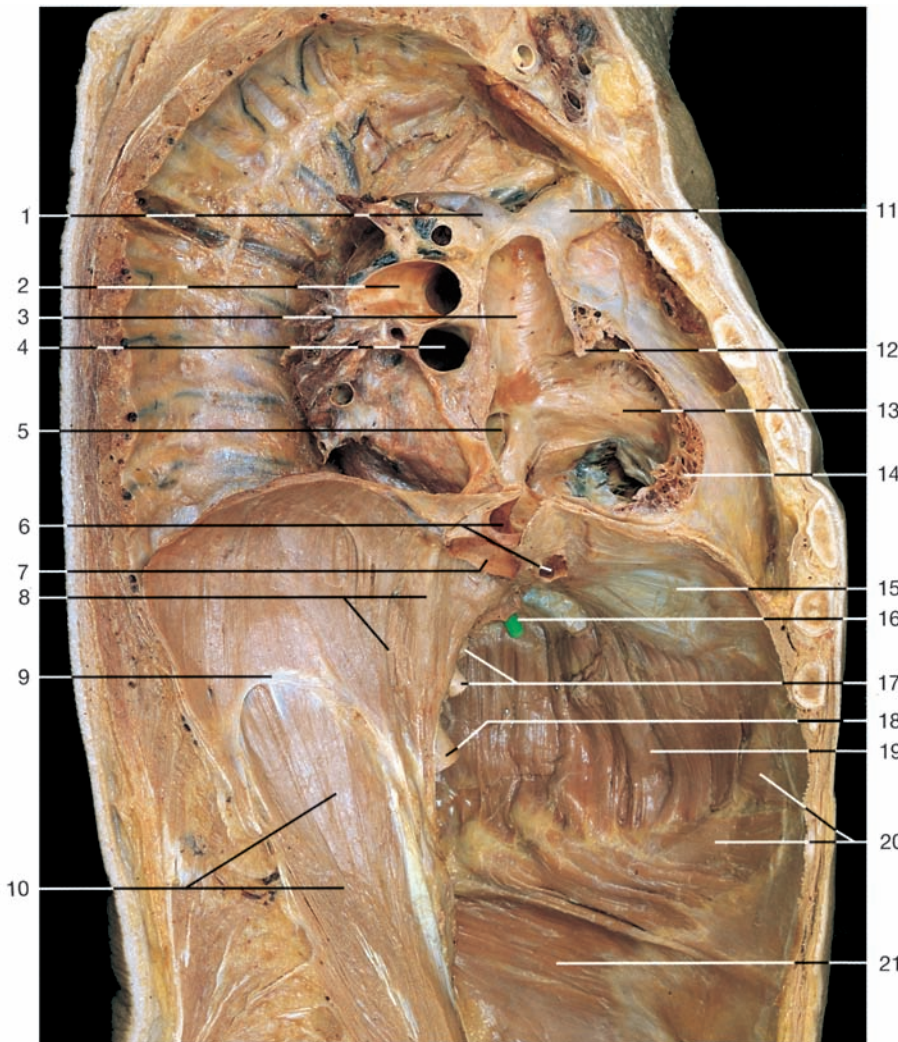
Mediastinal organs (left lateral aspect). Posterior and superior mediastinum. The heart with the pericardium is located in situ. Within the posterior mediastinum the descending thoracic aorta and the sympathetic trunk are shown.

- | | | |
|--|--|--|
| 1 Subclavian artery | 12 Scapula (divided) | 23 Posterior intercostal artery and vein and intercostal nerve |
| 2 Subclavian vein | 13 Posterior intercostal arteries | 24 Diaphragm |
| 3 Clavicle (divided) | 14 White ramus communicans of sympathetic trunk | 25 Common carotid artery |
| 4 Left vagus nerve | 15 Sympathetic trunk | 26 Subclavian artery |
| 5 First rib (divided) | 16 Aortic arch | 27 Highest intercostal artery |
| 6 Left superior intercostal vein | 17 Left vagus nerve and left recurrent laryngeal nerve | 28 Bifurcation of trachea |
| 7 Left atrium with pericardium | 18 Left pulmonary artery | 29 Celiac trunk |
| 8 Left phrenic nerve and pericardiophrenic artery and vein | 19 Left primary bronchus | 30 Renal artery |
| 9 Esophageal plexus (branches derived from left vagus nerve) | 20 Thoracic aorta | 31 Superior mesenteric artery |
| 10 Apex of the heart with pericardium | 21 Pulmonary vein | 32 Inferior mesenteric artery |
| 11 Brachial plexus | 22 Esophagus (thoracic part) | 33 Common iliac artery |



Diaphragm in situ (anterior aspect). Anterior walls of thoracic and abdominal cavities have been removed. Natural position of the heart above the central tendon on the diaphragm is shown.

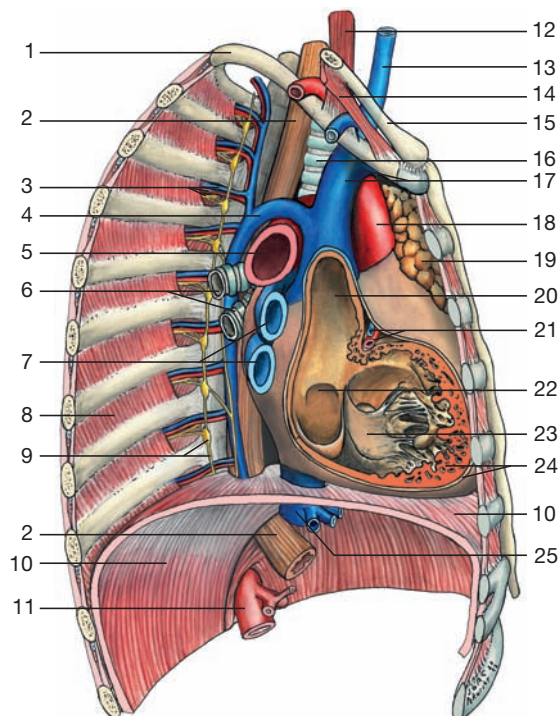




- 1 Azygos venous arch
- 2 Right pulmonary artery
- 3 Superior vena cava
- 4 Right pulmonary vein
- 5 Fossa ovalis
- 6 Hepatic veins
- 7 Inferior vena cava
- 8 Right crus of lumbar part of diaphragm
- 9 Medial arcuate ligament
- 10 Psoas major muscle
- 11 Left brachiocephalic vein
- 12 Terminal crista
- 13 Right atrium
- 14 Right auricle
- 15 Central tendon of diaphragm
- 16 Esophagus
- 17 Celiac trunk and superior mesenteric artery
- 18 Aorta
- 19 Costal part of diaphragm
- 20 Costal margin
- 21 Transverse abdominal muscle

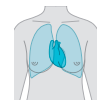
Diaphragm and thoracic organs.

Paramedian section to the right of the median plane through thoracic and upper abdominal cavities. The plane passes through the superior and inferior vena cava just to the right of the vertebral bodies. Most of the heart remains in situ to the left of this plane (viewed from the right side).

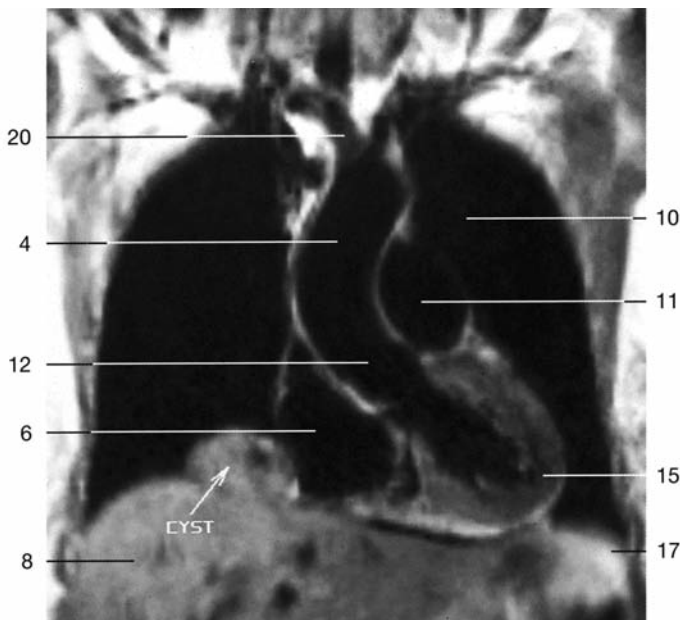


- 1 First rib
- 2 Esophagus
- 3 Intercostal artery, vein, and nerve
- 4 Azygos venous arch
- 5 Pulmonal artery
- 6 Right bronchi
- 7 Pulmonary veins
- 8 Internal intercostal muscle
- 9 Sympathetic trunk
- 10 Diaphragm
- 11 Abdominal aorta
- 12 Anterior scalene muscle
- 13 Internal jugular vein
- 14 Subclavius muscle
- 15 Clavicle
- 16 Trachea
- 17 Junction between superior vena cava and left brachiocephalic vein
- 18 Aorta
- 19 Remnants of thymus gland
- 20 Entrance of superior vena cava into the right atrium
- 21 Right coronary artery and vein
- 22 Fossa ovalis
- 23 Right atrioventricular valve and anterior papillary muscle
- 24 Right ventricle with pericardium
- 25 Inferior vena cava

Diaphragm and thoracic organs (paramedian section).
The heart is partly dissected.

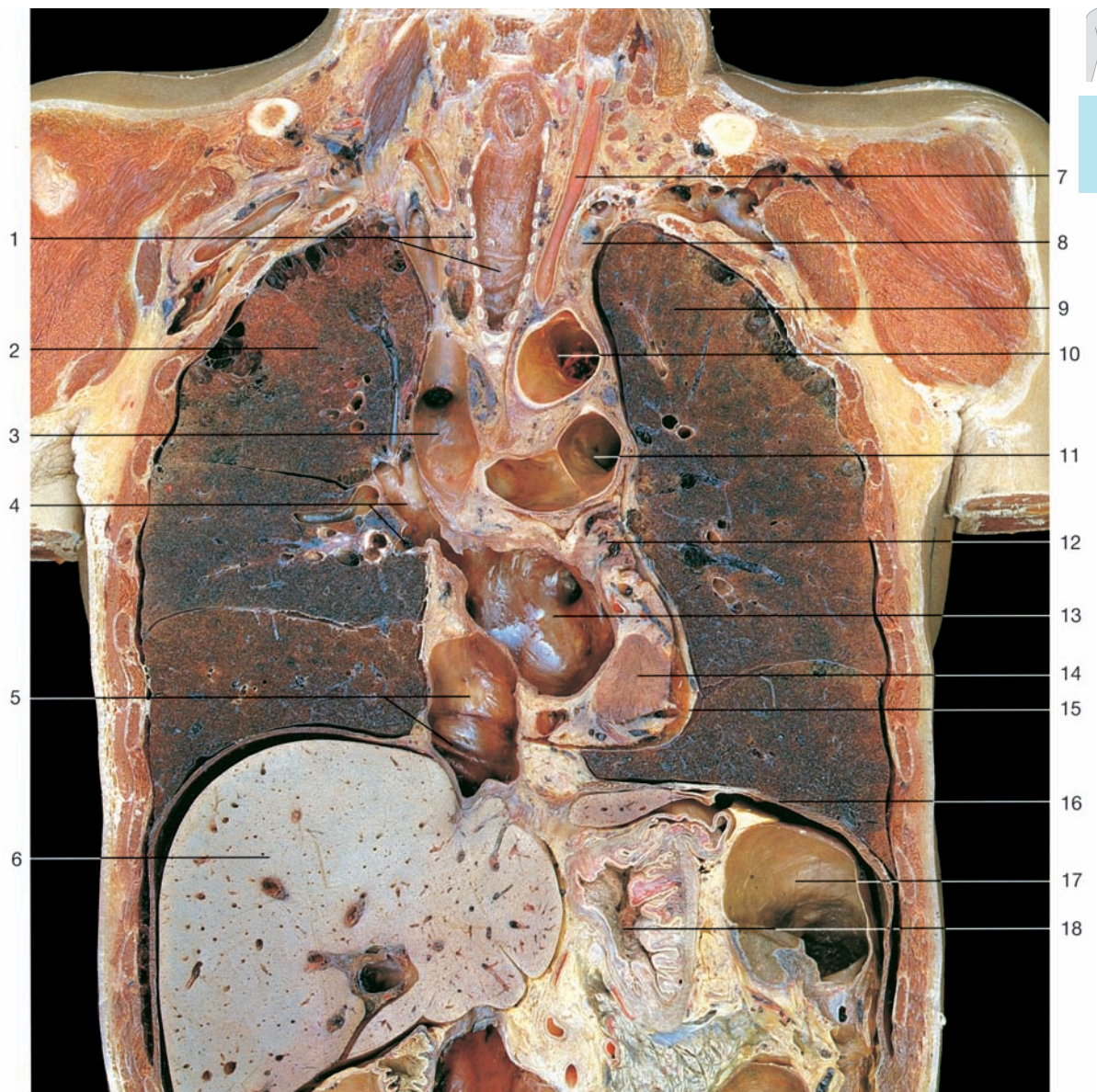


Coronal section through the thorax at the level of the ascending aorta (anterior aspect).

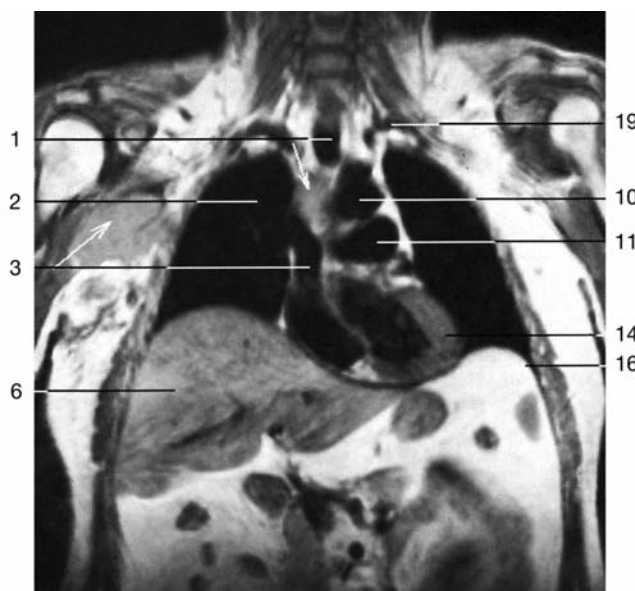


Coronal section through the thorax at the level of the ascending aorta (MRI scan).

- 1 Clavicle
- 2 Left brachiocephalic vein
- 3 Upper lobe of right lung
- 4 Aortic arch
- 5 Superior vena cava
- 6 Right atrium (entrance of inferior vena cava)
- 7 Coronary sinus
- 8 Liver
- 9 Second rib
- 10 Upper lobe of left lung
- 11 Pulmonary trunk
- 12 Ascending aorta and left coronary artery
- 13 Aortic valve
- 14 Pericardium
- 15 Myocardium of left ventricle
- 16 Lower lobe of left lung
- 17 Diaphragm
- 18 Colic flexures
- 19 Stomach
- 20 Brachiocephalic trunk

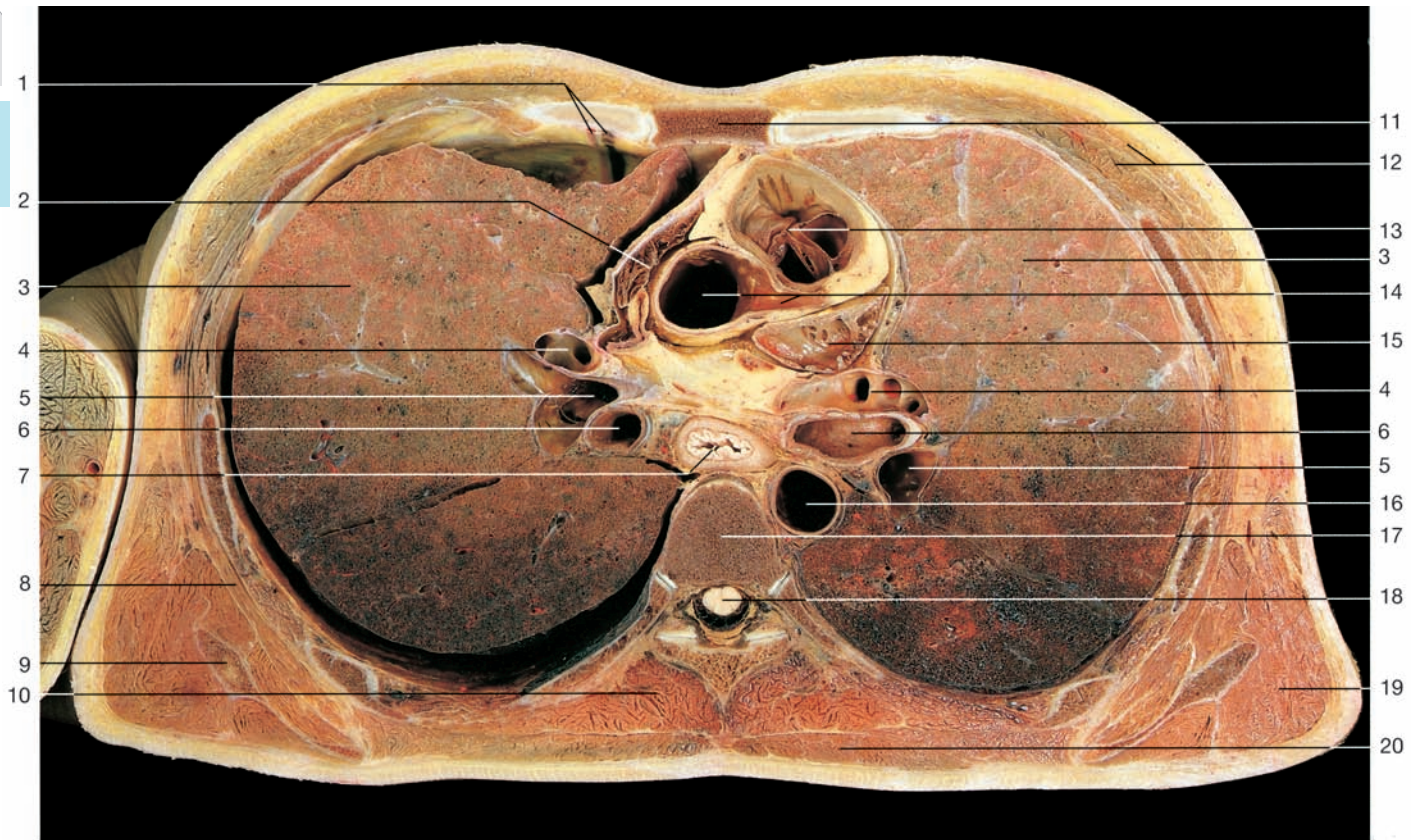
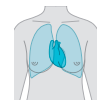


Coronal section through the thorax at the level of superior and inferior vena cava (anterior aspect).

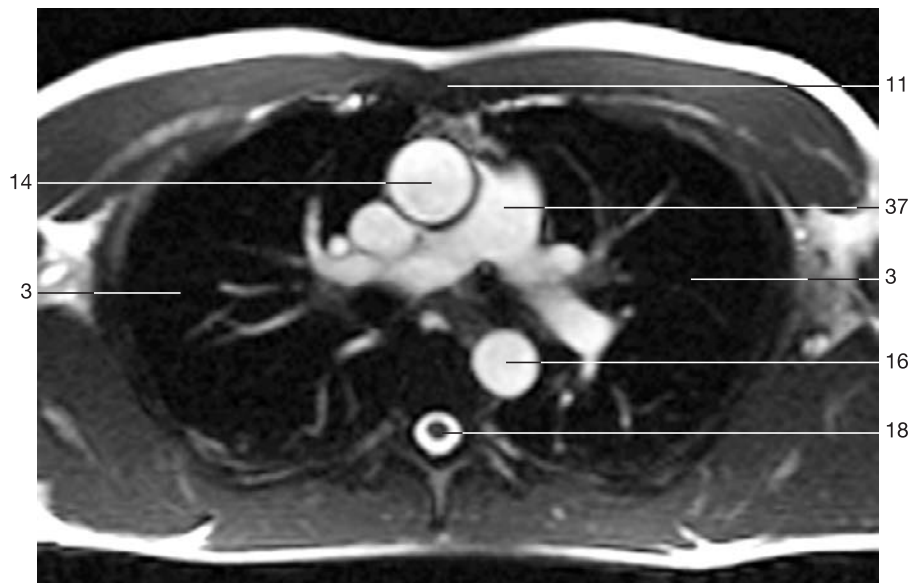


- 1 Trachea
- 2 Upper lobe of right lung
- 3 Superior vena cava
- 4 Right pulmonary veins
- 5 Inferior vena cava and right atrium
- 6 Liver
- 7 Left common carotid artery
- 8 Left subclavian vein
- 9 Upper lobe of left lung
- 10 Aortic arch
- 11 Left pulmonary artery
- 12 Left auricle
- 13 Left atrium with orifices of pulmonary veins
- 14 Left ventricle (myocardium)
- 15 Pericardium
- 16 Diaphragm
- 17 Left colic flexure
- 18 Stomach
- 19 Left subclavian artery

Coronal section through the thorax at the level of the superior vena cava (MRI scan). Arrows: metastases of tumor.



Horizontal section through the thorax. Section 1 (from below).

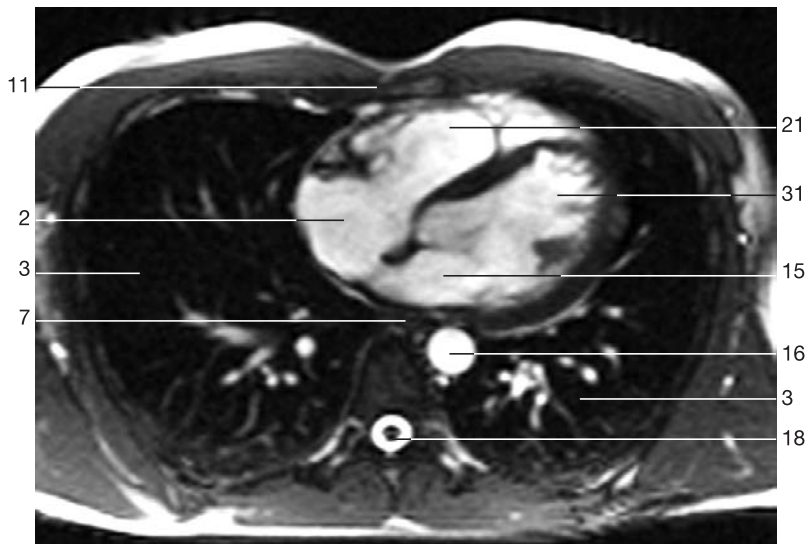


Horizontal section through the thorax at the level of section 1 (MRI scan).
(Prof. Bautz and Dr. Janka, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

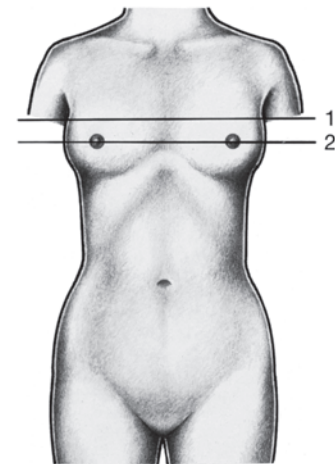
- | | |
|-------------------------------------|--|
| 1 Internal thoracic artery and vein | 12 Pectoralis major and minor muscles |
| 2 Right atrium | 13 Conus arteriosus (right ventricle) and pulmonic valve |
| 3 Lung | 14 Ascending aorta and left coronary artery (only in the upper figure) |
| 4 Pulmonary artery | 15 Left atrium |
| 5 Pulmonary vein | 16 Descending aorta |
| 6 Primary bronchus | 17 Thoracic vertebra |
| 7 Esophagus | 18 Spinal cord |
| 8 Serratus anterior muscle | 19 Latissimus dorsi muscle |
| 9 Scapula | 20 Trapezius muscle |
| 10 Longissimus thoracis muscle | |
| 11 Sternum | |



Horizontal section through the thorax. Section 2 (from below).

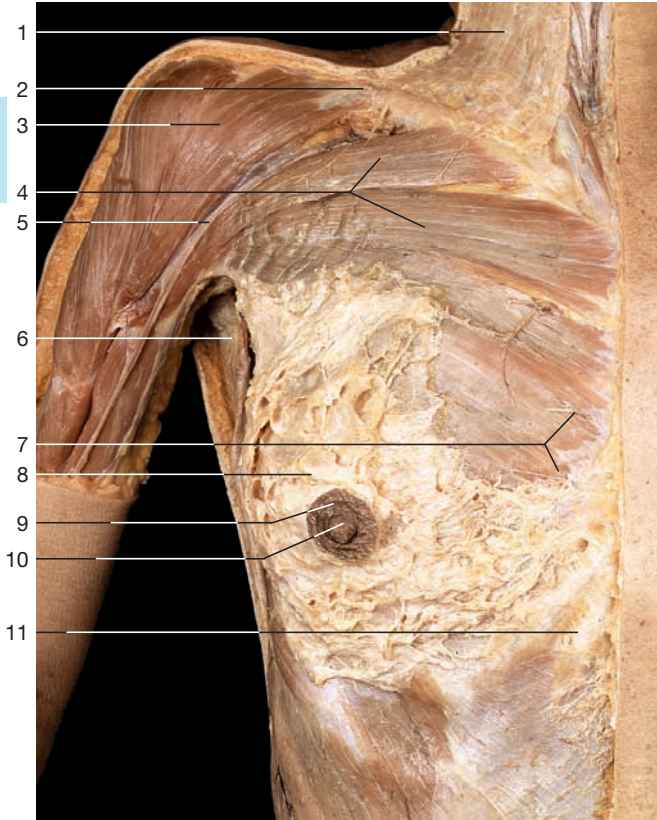


Horizontal section through the thorax at the level of section 2 (MRI scan).
(Prof. Bautz and Dr. Janka, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



Horizontal section through the thorax.
Levels of the sections are indicated.

- | | |
|---------------------------------|--|
| 21 Right ventricle | 30 Nipple |
| 22 Right coronary artery | 31 Left ventricle |
| 23 Right atrioventricular valve | 32 Pericardium |
| 24 Lung (upper lobe) | 33 Left atrioventricular valve |
| 25 Left atrium | 34 Left coronary artery and coronary sinus |
| 26 Pulmonary veins | 35 Accessory hemiazygos vein |
| 27 Lung (lower lobe) | 36 Serratus anterior muscle |
| 28 Erector muscle of spine | 37 Pulmonary trunk |
| 29 Third costal cartilage | |



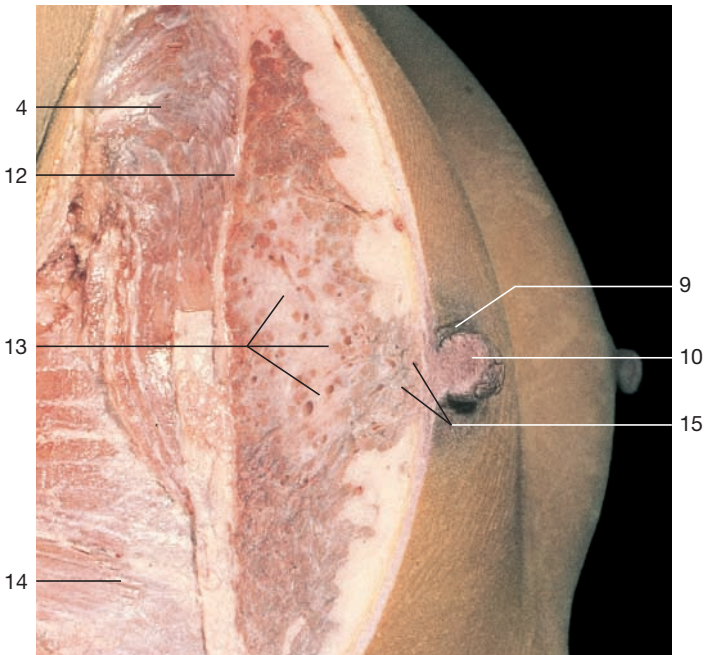
Dissection of mammary gland (anterior aspect).

- | | | | |
|---|---|----|--------------------------------------|
| 1 | Platysma muscle | 8 | Breast tissue |
| 2 | Clavicle | 9 | Areola |
| 3 | Deltoid muscle | 10 | Nipple (papilla) |
| 4 | Pectoralis major muscle | 11 | Costal margin |
| 5 | Deltopectoral groove and cephalic vein | 12 | Pectoral fascia |
| 6 | Latissimus dorsi muscle | 13 | Mammary gland |
| 7 | Medial mammarian branches of intercostal nerves | 14 | Serratus anterior muscle (insertion) |
| | | 15 | Lactiferous sinus |

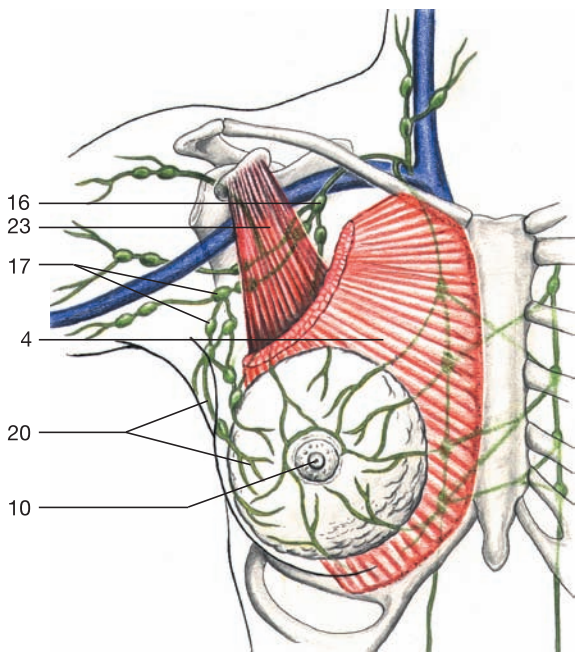


Dissection of mammary gland and axillary lymph nodes.

- | | |
|----|---|
| 16 | Apical lymph nodes |
| 17 | Axillary lymph nodes |
| 18 | Intercostobrachial nerve |
| 19 | Lateral thoracic vein |
| 20 | Lymph vessels |
| 21 | Serratus anterior muscle |
| 22 | Medial branches of intercostal arteries |
| 23 | Pectoralis minor muscle |



Mammary gland (sagittal section) of a pregnant female.

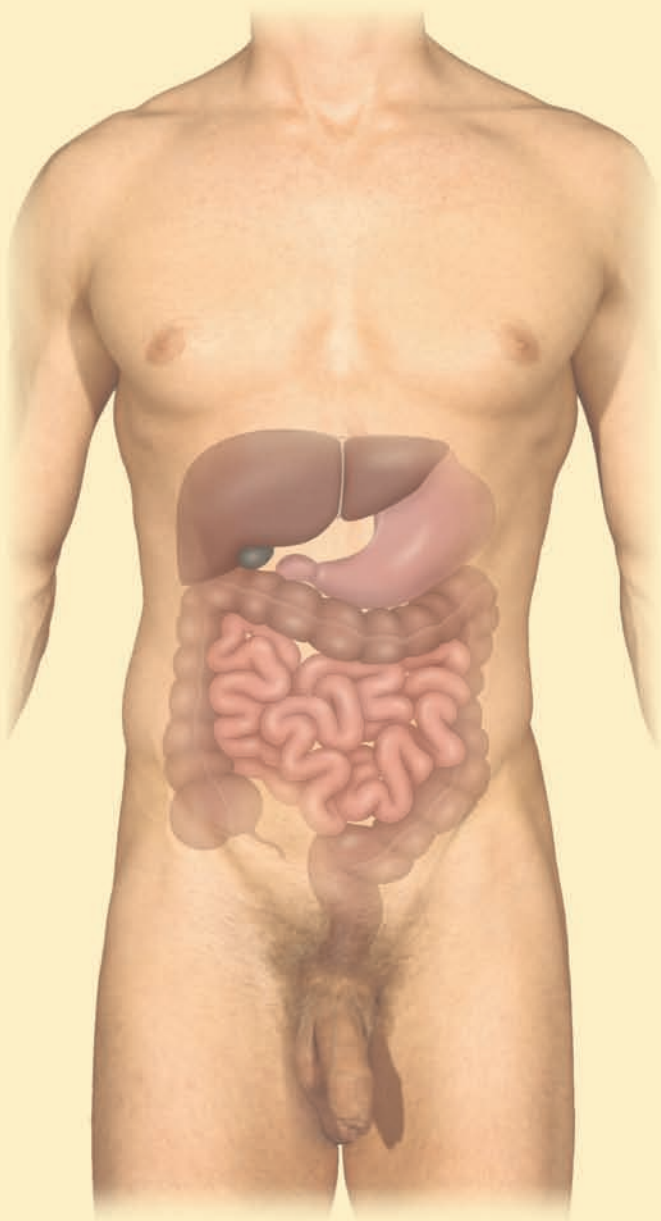


Lymphatics of the mammary gland. Most lymph vessels drain into the axillary lymph nodes.

5 Abdominal Organs



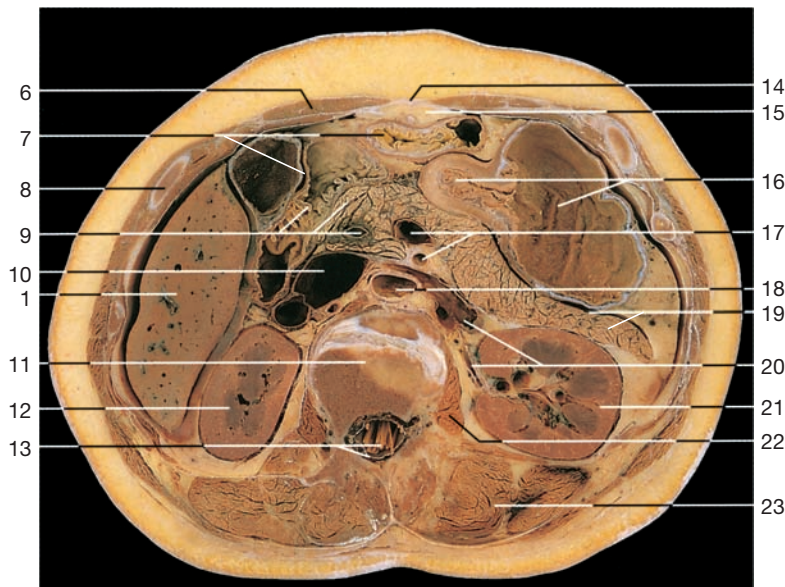
Position of the Abdominal Organs _____	300
Anterior Abdominal Wall _____	301
Stomach _____	302
Pancreas and Bile Ducts _____	304
Liver _____	307
Spleen _____	309
Vessels of the Abdominal Organs _____	310
Dissection of the Abdominal Organs _____	316
Posterior Abdominal Wall _____	326
Horizontal Sections through the Abdominal Cavity ____	330
Midsagittal Sections through the Abdominal Cavity ____	332





- 1 Liver (left lobe)
- 2 Stomach
- 3 Transverse colon
- 4 Small intestine
- 5 Cecum with vermiform appendix
- 6 Rectus abdominis muscle
- 7 Small intestine and peritoneum
- 8 Rib (cut)
- 9 Bile duct, duodenum, and pancreas
- 10 Inferior vena cava
- 11 Body of second lumbar vertebra (L₂)
- 12 Right kidney
- 13 Cauda equina and dura mater
- 14 Linea alba
- 15 Falciform ligament
- 16 Stomach and pylorus
- 17 Superior mesenteric artery and vein
- 18 Abdominal aorta
- 19 Pancreas adjacent to lesser sac (omental bursa)
- 20 Left renal artery and vein
- 21 Left kidney
- 22 Psoas major muscle
- 23 Deep muscles of the back

Abdominal organs in situ (anterior aspect). The greater omentum has been partly removed or reflected.



Horizontal section through the abdominal cavity at the level of the second lumbar vertebra (from below).

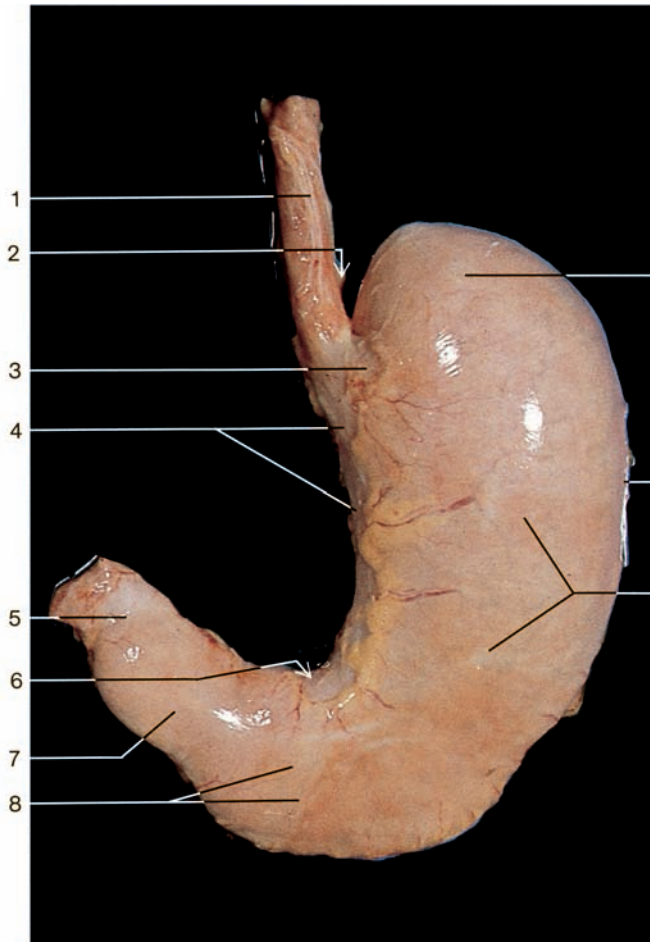


Anterior abdominal wall of the male. Frontal section through pelvic cavity and hip joints (internal aspect).

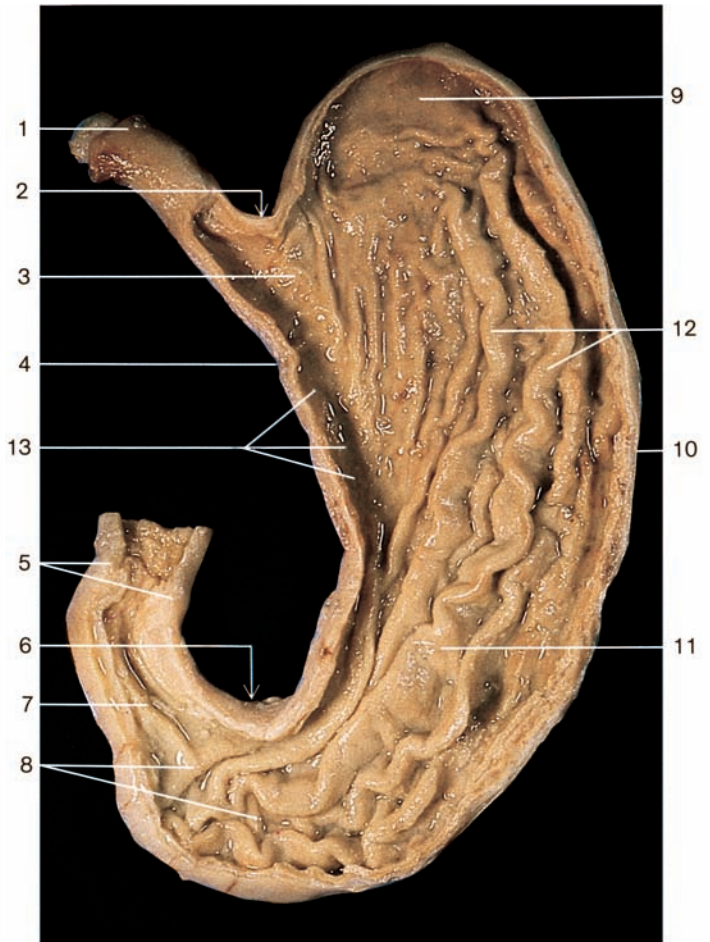


- 1 Left ventricle with pericardium
- 2 Diaphragm
- 3 Remnant of liver
- 4 Ligamentum teres
(free margin of falciform ligament)
- 5 Site of umbilicus
- 6 Medial umbilical fold
(containing the obliterated umbilical artery)
- 7 Lateral umbilical fold
(containing inferior epigastric artery and vein)
- 8 Median umbilical fold
(containing remnant of urachus)
- 9 Head of femur and pelvic bone
- 10 Urinary bladder
- 11 Root of penis
- 12 Falciform ligament of liver
- 13 Rib (divided)
- 14 Iliac crest (divided)
- 15 Site of deep inguinal ring and lateral inguinal fossa
- 16 Iliopsoas muscle (divided)
- 17 Medial inguinal fossa
- 18 Suprapubic fossa
- 19 Posterior layer of rectus sheath
- 20 Transverse abdominal muscle
- 21 Umbilicus and arcuate line
- 22 Inferior epigastric artery
- 23 Femoral nerve
- 24 Iliopsoas muscle
- 25 Remnant of umbilical artery
- 26 Femoral artery and vein
- 27 Tendinous intersection of rectus abdominis muscle
- 28 Rectus abdominis muscle
- 29 Interfoveolar ligament
- 30 Pubic symphysis (divided)
- 31 External iliac artery and vein

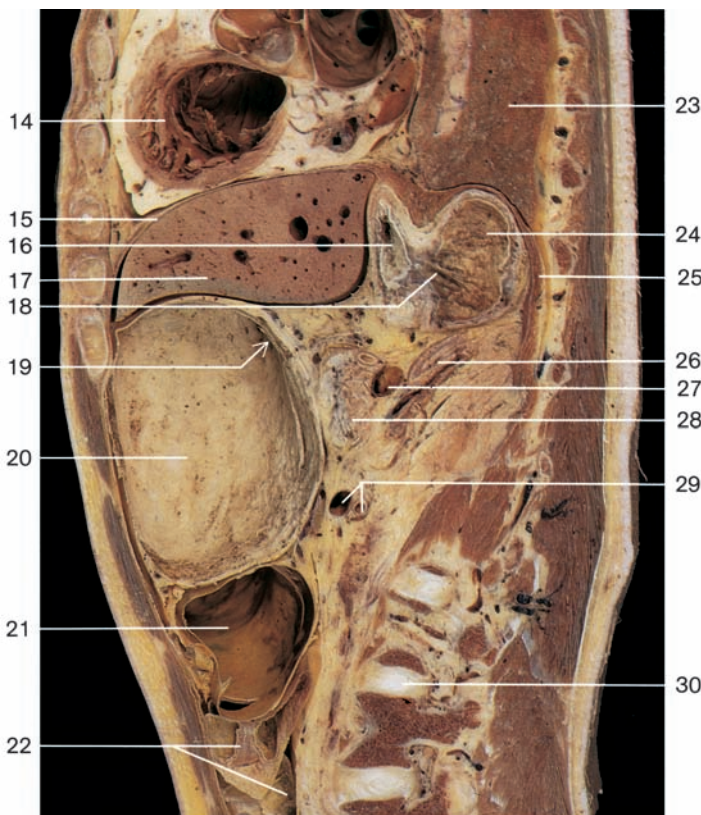
Anterior abdominal wall of the male (internal aspect). The peritoneum and parts of the posterior layer of rectus sheath have been removed. Dissection of inferior epigastric arteries and veins.



Stomach (anterior aspect).

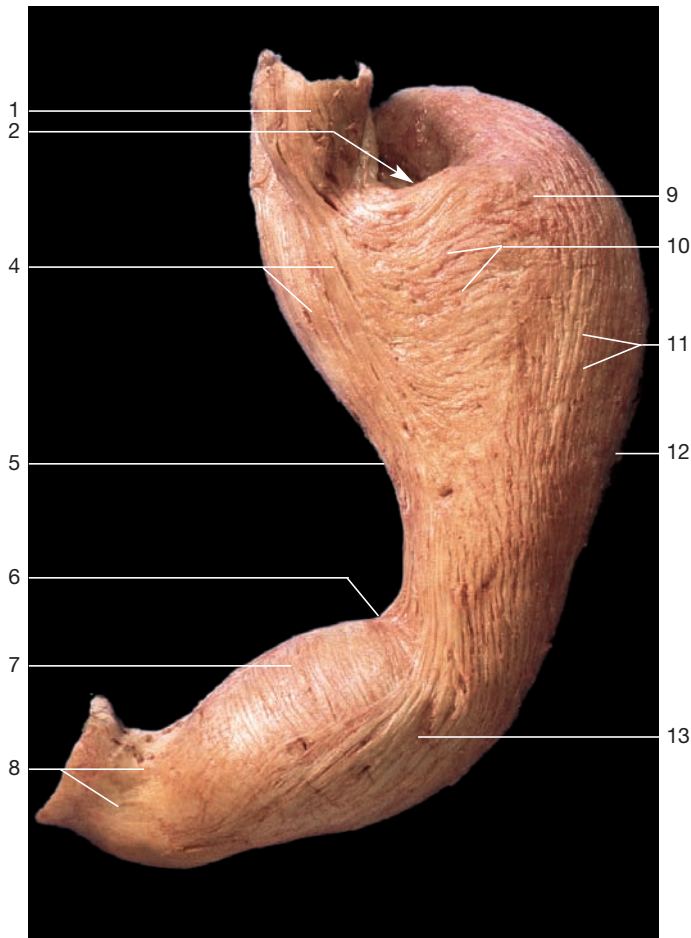


Mucosa of posterior wall of stomach (anterior aspect).

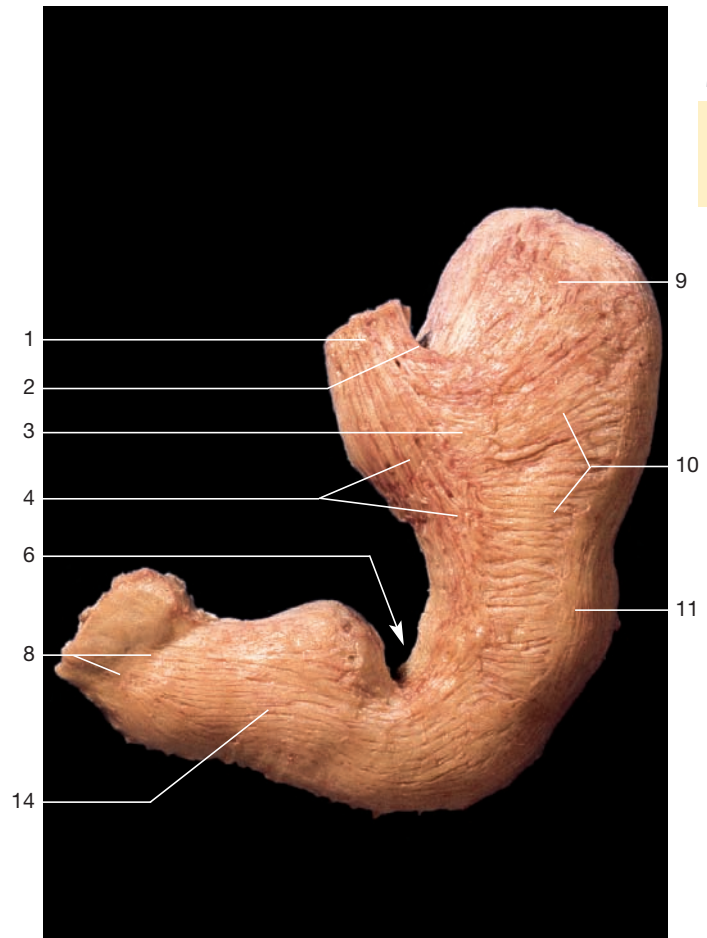


Position of the stomach (parasagittal section through upper part of left abdominal cavity 3.5 cm lateral to median plane).

- 1 Esophagus
- 2 Cardial notch
- 3 Cardial part of stomach
- 4 Lesser curvature of stomach
- 5 Pyloric sphincter
- 6 Angular notch (incisura angularis)
- 7 Pyloric canal
- 8 Pyloric antrum
- 9 Fundus of stomach
- 10 Greater curvature of stomach
- 11 Body of stomach
- 12 Folds of mucous membrane (gastric rugae)
- 13 Gastric canal
- 14 Right ventricle of heart
- 15 Diaphragm (cut edge)
- 16 Abdominal part of esophagus
- 17 Liver
- 18 Cardial part of stomach (cut edge)
- 19 Position of pyloric canal
- 20 Body of stomach
- 21 Transverse colon
- 22 Small intestine
- 23 Lung (cut edge)
- 24 Fundus of stomach (section)
- 25 Lumbar part of diaphragm (cut edge)
- 26 Suprarenal gland
- 27 Splenic vein
- 28 Pancreas
- 29 Superior mesenteric artery and vein
- 30 Intervertebral disc



Muscular coat of stomach, outer layer (anterior aspect).

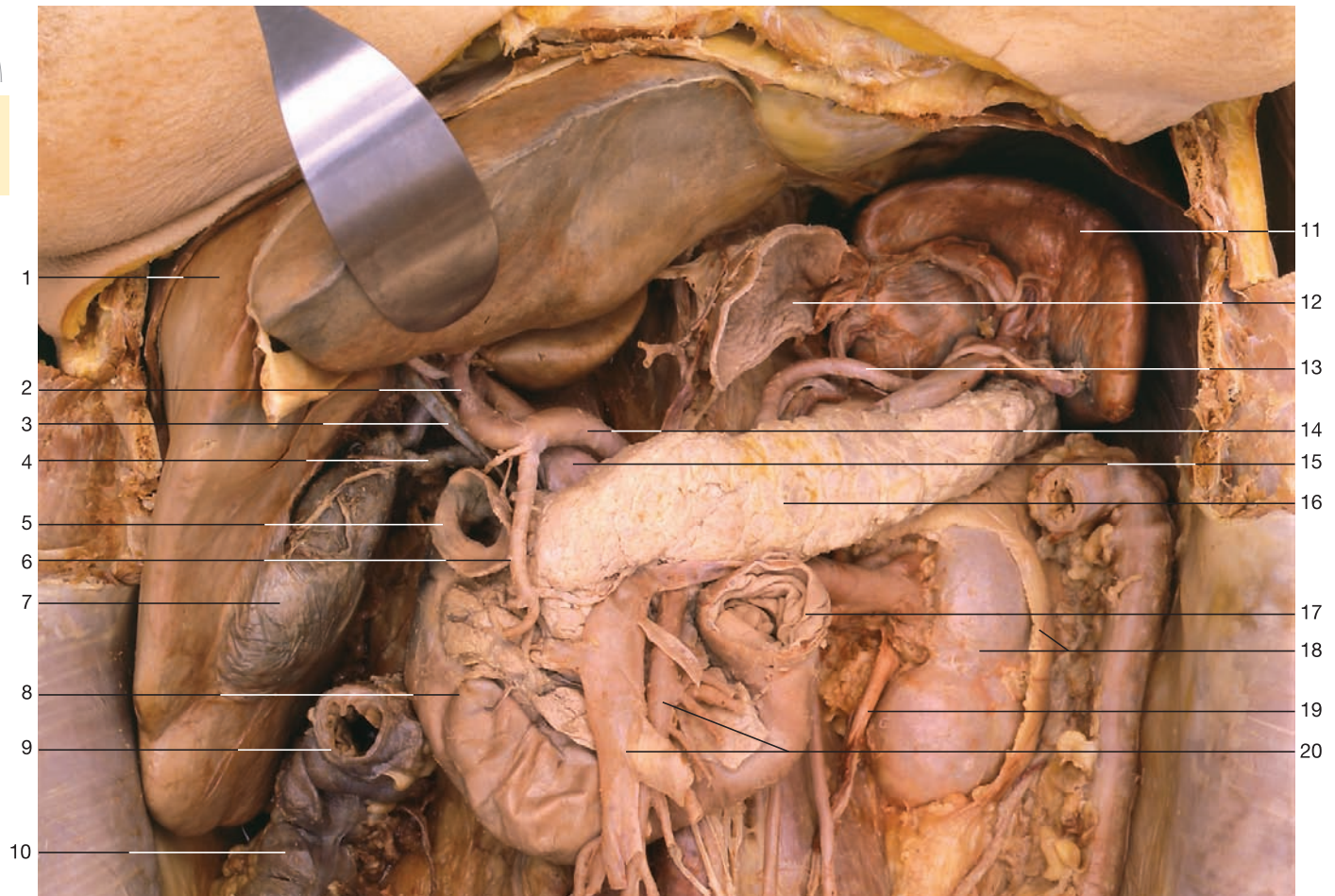


Muscular coat of stomach, middle layer (anterior aspect).

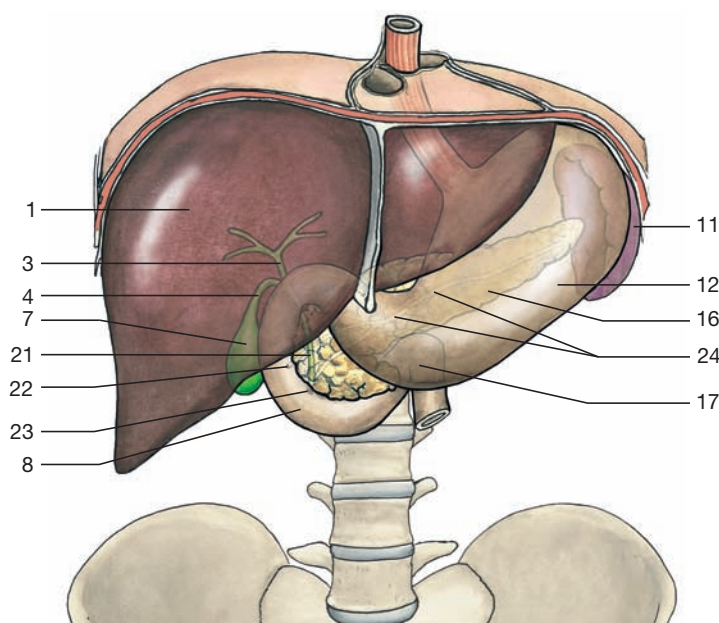
- 1 Esophagus (abdominal part)
- 2 Cardial notch
- 3 Cardial part of stomach
- 4 Longitudinal muscle layer at lesser curvature of stomach
- 5 Lesser curvature
- 6 Incisura angularis
- 7 Circular muscle layer of pyloric part of stomach
- 8 Pyloric sphincter muscle
- 9 Fundus of stomach
- 10 Circular muscle layer of fundus of stomach
- 11 Longitudinal muscle layer of greater curvature of stomach
- 12 Greater curvature of stomach
- 13 Longitudinal muscle layer (transition from body to pyloric part of stomach)
- 14 Pyloric part of stomach
- 15 Oblique muscle fibers



Muscular coat of stomach, inner layer (anterior aspect).

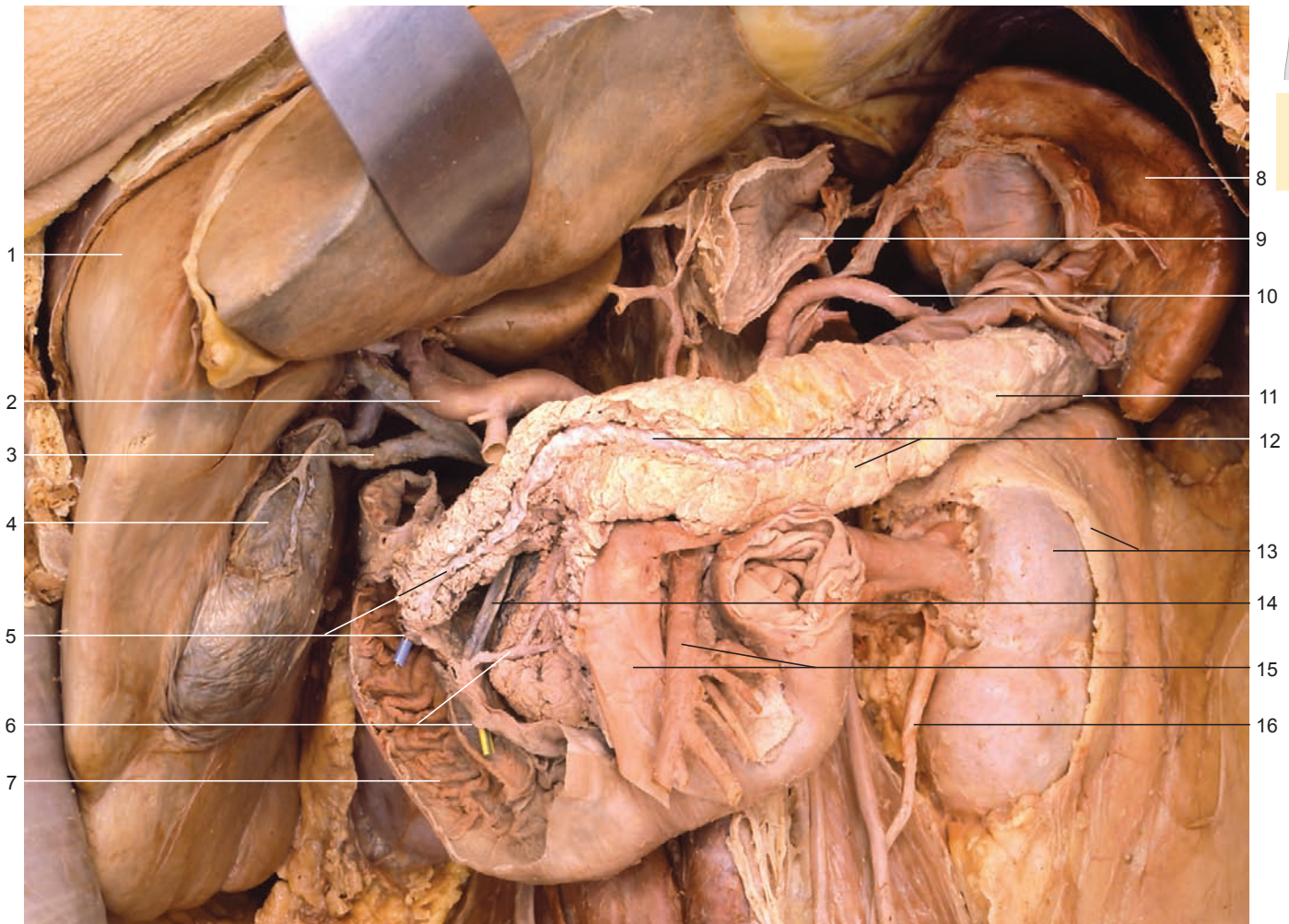


Upper abdominal region with pancreas, duodenum, spleen, and left kidney (anterior aspect). Stomach and transverse colon have been removed and the liver elevated; the superior mesenteric vein is slightly enlarged.

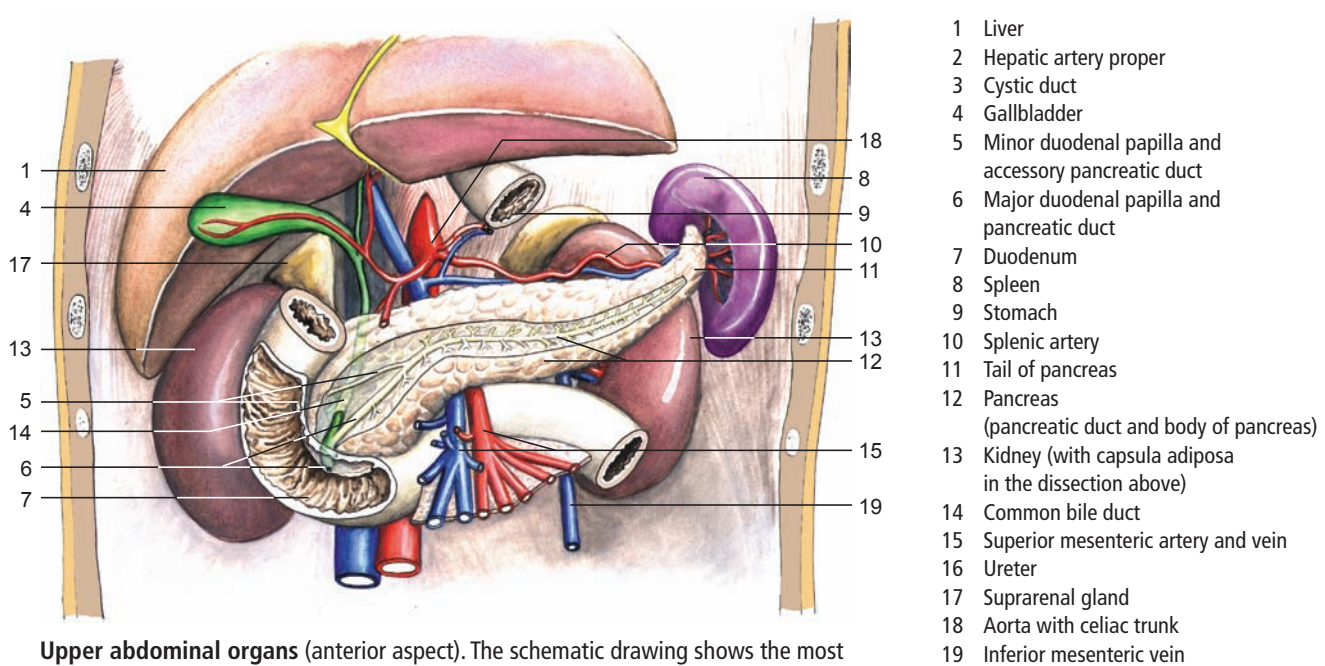


Pancreas, duodenum, liver, and extrahepatic bile ducts (anterior aspect).

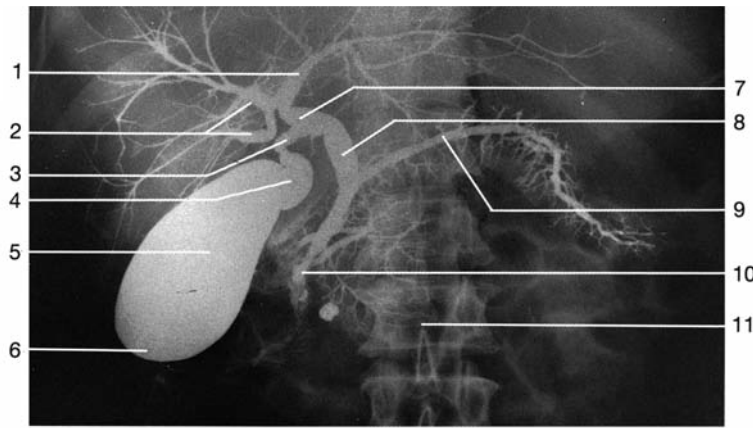
- 1 Liver
- 2 Hepatic artery proper
- 3 Hepatic duct
- 4 Cystic duct
- 5 Pylorus
- 6 Gastroduodenal artery
- 7 Gallbladder
- 8 Duodenum
- 9 Right colic flexure
- 10 Ascending colon
- 11 Spleen
- 12 Stomach
- 13 Splenic artery
- 14 Common hepatic artery
- 15 Portal vein
- 16 Pancreas
- 17 Duodenojejunal flexure
- 18 Kidney (with capsula adiposa)
- 19 Ureter
- 20 Superior mesenteric artery and vein
- 21 Common bile duct
- 22 Minor duodenal papilla
- 23 Major duodenal papilla
- 24 Pancreatic duct



Upper abdominal region with pancreas, duodenum, spleen, and left kidney (anterior aspect). Stomach and transverse colon have been removed and the duodenum fenestrated. The liver has been elevated to show the extrahepatic bile ducts. In this case the accessory pancreatic duct represents the main excretory duct of the pancreas.



Upper abdominal organs (anterior aspect). The schematic drawing shows the most common situation of the pancreatic ducts.



Bile ducts, gallbladder, and pancreatic duct (X-ray, a.-p. direction).

- 1 Left hepatic duct
- 2 Right hepatic duct
- 3 Cystic duct
- 4 Neck of gallbladder
- 5 Body of gallbladder
- 6 Fundus of gallbladder
- 7 Common hepatic duct
- 8 Common bile duct
- 9 Pancreatic duct
- 10 Major duodenal papilla
- 11 Second lumbar vertebra
- 12 Folds of mucous membrane of gallbladder
- 13 Muscular coat of gallbladder
- 14 Neck of gallbladder (opened)
- 15 Cystic duct with spiral fold
- 16 Minor duodenal papilla
- 17 Accessory pancreatic duct
- 18 Uncinate process
- 19 Plica circularis of duodenum (Kerckring's fold)
- 20 Head of pancreas
- 21 Body of pancreas
- 22 Tail of pancreas
- 23 Descending part of duodenum
- 24 Incisure of pancreas

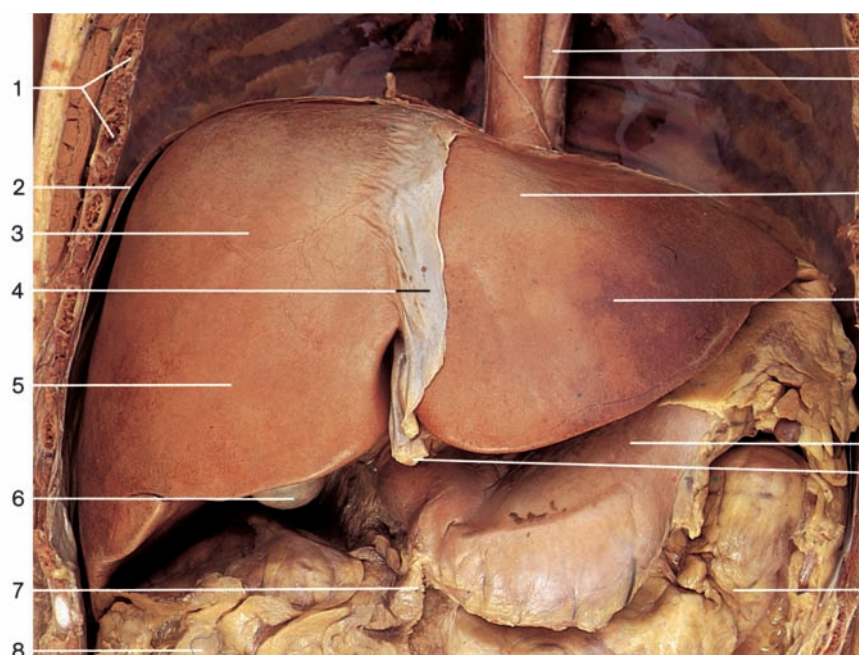


Isolated gallbladder and cystic duct (anterior aspect).

The gallbladder has been opened to display the mucous membrane.



Pancreas with descending part of duodenum (posterior aspect). The duodenum was opened to display the duodenal papillae. Pancreatic duct has been dissected, the common bile duct has been divided. The sphincter of Oddi is shown.

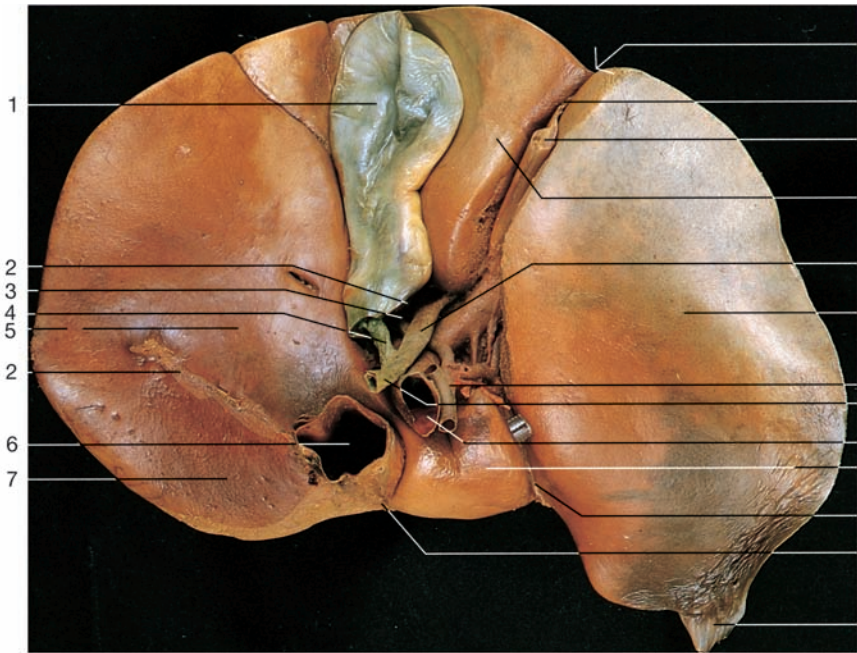


Liver in situ (anterior aspect). Part of the diaphragm has been removed.



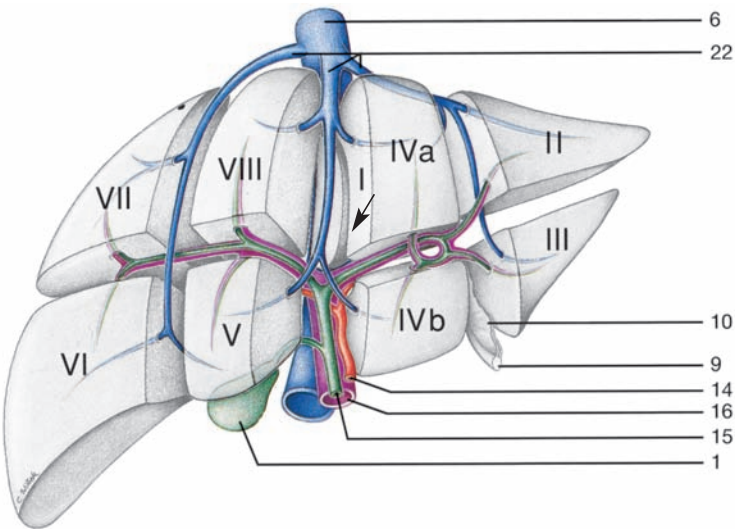
Liver in situ (parasagittal section through the left side of the abdomen 2 cm lateral to median plane).

- 1 Ribs (cut edges)
- 2 Diaphragm
- 3 Diaphragmatic surface of liver
- 4 Falciform ligament of liver
- 5 Right lobe of liver
- 6 Fundus of gallbladder
- 7 Gastrocolic ligament
- 8 Greater omentum
- 9 Aorta
- 10 Esophagus
- 11 Left lobe of liver
- 12 Stomach
- 13 Ligamentum teres
- 14 Transverse colon
- 15 Right atrium of heart
- 16 Central tendon and sternal portion of diaphragm
- 17 Liver (cut edge)
- 18 Entrance to duodenum (pylorus)
- 19 Stomach
- 20 Duodenum
- 21 Transverse colon (divided, dilated)
- 22 Small intestine
- 23 Thoracic aorta (longitudinally divided)
- 24 Esophagus (longitudinally divided)
- 25 Esophageal hiatus of diaphragm
- 26 Omental bursa (lesser sac)
- 27 Splenic artery
- 28 Pancreas
- 29 Left renal vein
- 30 Intervertebral disc
- 31 Abdominal aorta (longitudinally divided)

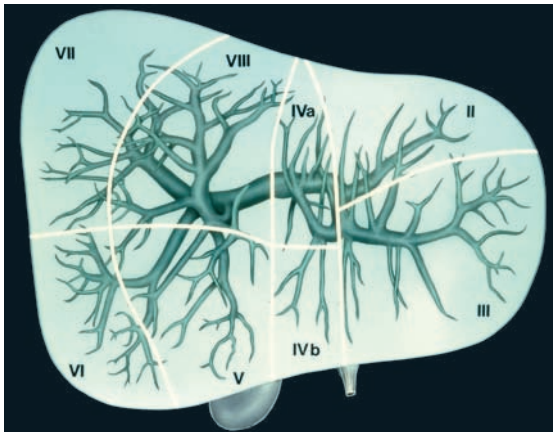
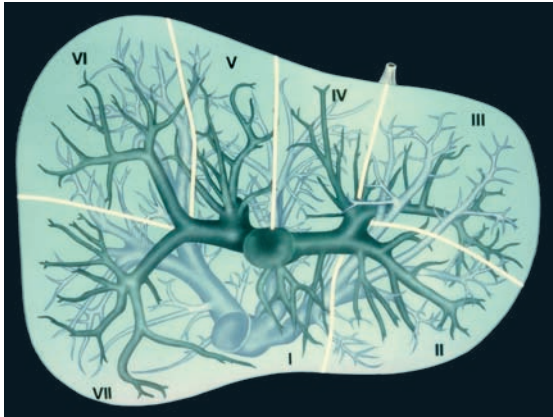


- 1 Fundus of gallbladder
- 2 Peritoneum (cut edges)
- 3 Cystic artery
- 4 Cystic duct
- 5 Right lobe of liver
- 6 Inferior vena cava
- 7 Bare area of liver
- 8 Notch for ligamentum teres and falciform ligament
- 9 Ligamentum teres
- 10 Falciform ligament of liver
- 11 Quadrate lobe of liver
- 12 Common hepatic duct
- 13 Left lobe of liver
- 14 Hepatic artery proper
- 15 Common bile duct
- 16 Portal vein
- 17 Caudate lobe of liver
- 18 Ligamentum venosum
- 19 Ligament of inferior vena cava
- 20 Appendix fibrosa (left triangular ligament)
- 21 Coronary ligament of liver
- 22 Hepatic veins
- 23 Porta hepatis

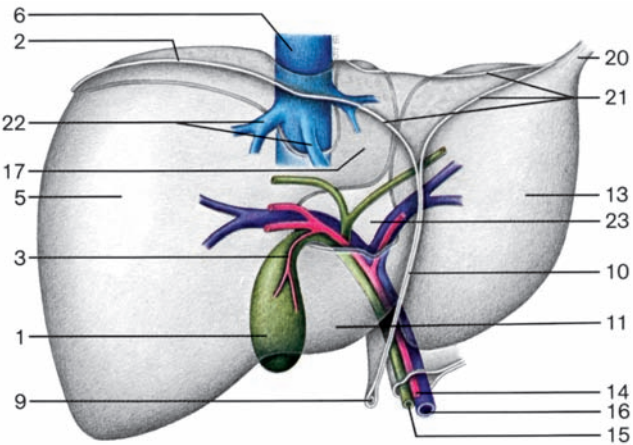
Liver (inferior aspect). Dissection of porta hepatis. Gallbladder partly collapsed. Ventral margin of liver above.



Segmentation of the liver (anterior aspect). Liver segments indicated by Roman numerals.



Liver segments I–VIII. The three main hepatic veins (blue within both schematic drawings shown on the left) drain the eight segments of the liver that have no visible external markings. Upper drawing = inferior aspect; lower drawing = superior aspect.

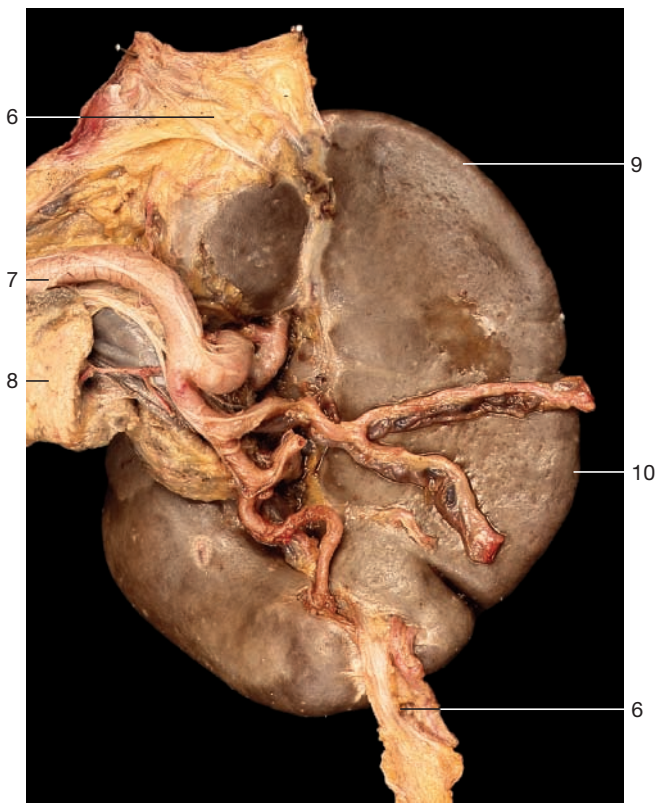


Liver and margins of peritoneal folds (anterior aspect).

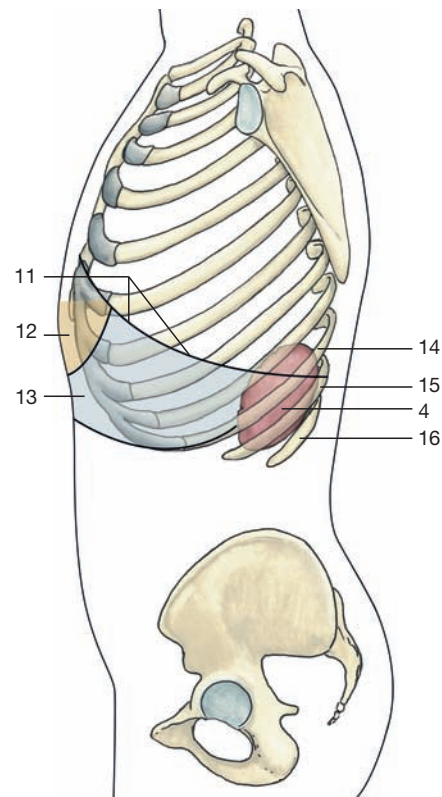


- 1 Serratus anterior muscle
- 2 Left lung
- 3 Diaphragm
- 4 Spleen
- 5 External abdominal oblique muscle
- 6 Gastrosplenic ligament
- 7 Splenic artery
- 8 Tail of pancreas
- 9 Superior border of spleen
- 10 Anterior border of spleen
- 11 Border of lung
- 12 Area of liver
- 13 Area of stomach
- 14 Tenth rib
- 15 Eleventh rib
- 16 Twelfth rib

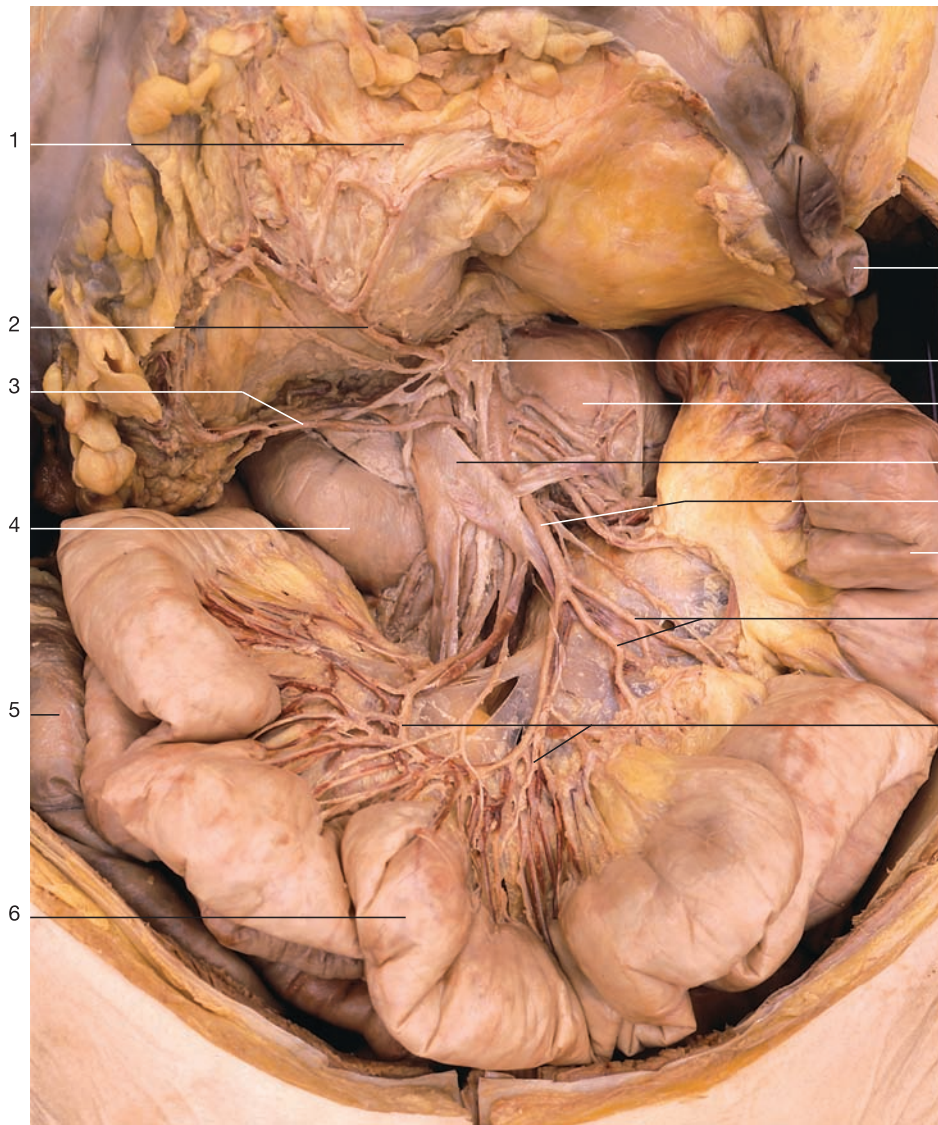
Spleen in situ (left lateral aspect). Intercostal spaces and diaphragm have been fenestrated.



Spleen (visceral surface). Hilum of spleen with vessels, nerves, and ligaments.

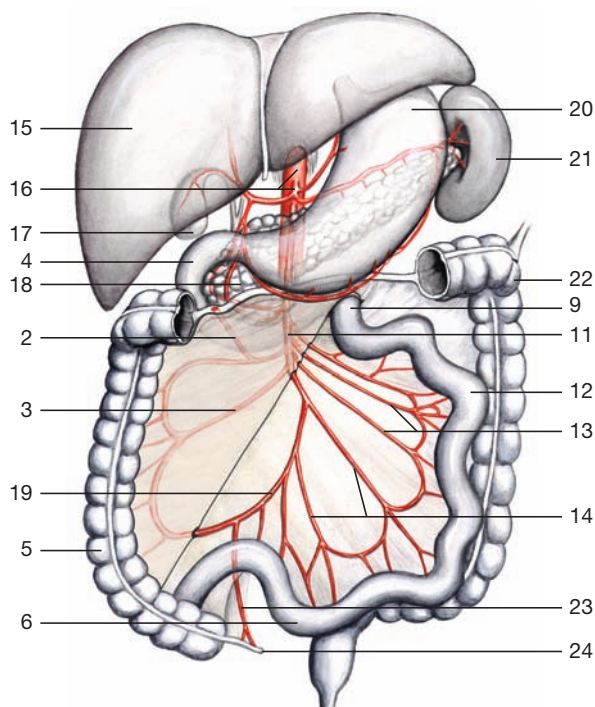


Location of the spleen (left lateral aspect).

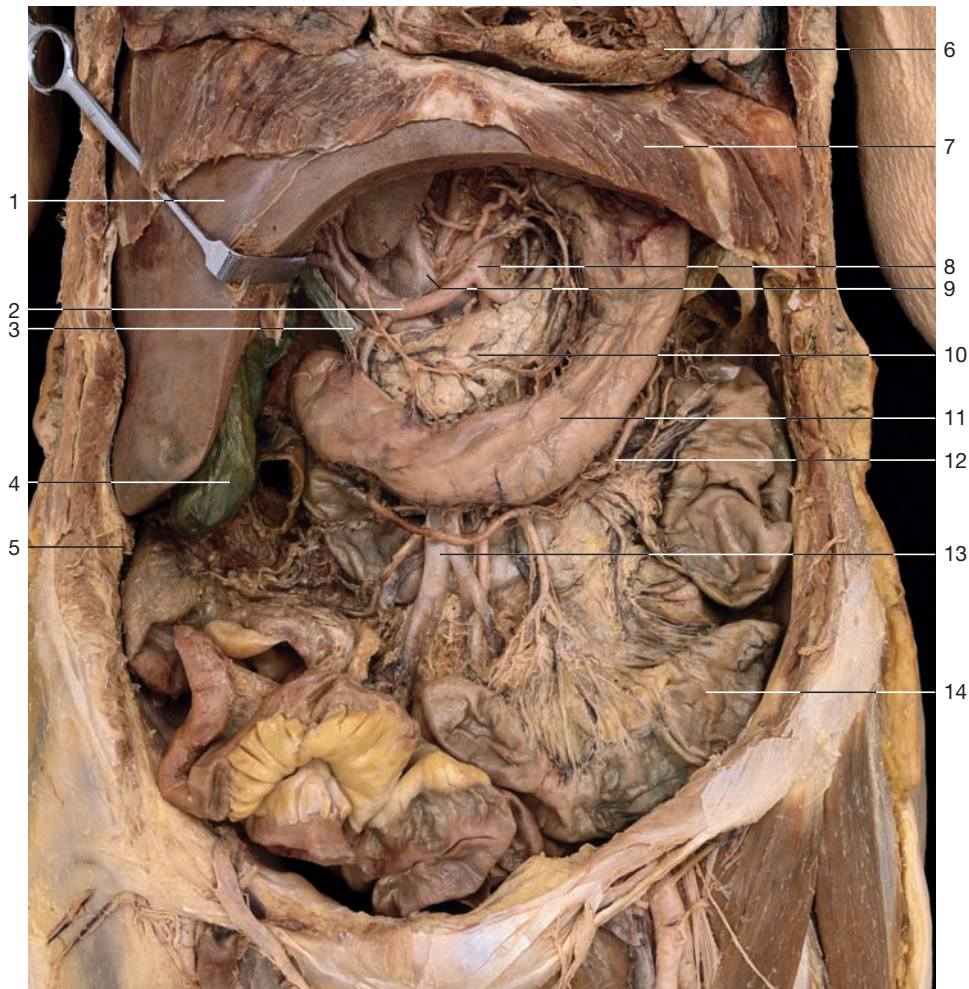


- 1 Greater omentum
- 2 Middle colic artery
- 3 Right colic artery
- 4 Duodenum
- 5 Ascending colon
- 6 Ileum
- 7 Transverse colon
- 8 Celiac plexus
- 9 Duodenojejunal flexure
- 10 Superior mesenteric vein
- 11 Superior mesenteric artery
- 12 Jejunum
- 13 Jejunal arteries
- 14 Ileal arteries
- 15 Liver
- 16 Celiac trunk and abdominal aorta
- 17 Gallbladder
- 18 Pancreas
- 19 Ileocolic artery
- 20 Stomach
- 21 Spleen
- 22 Left colic flexure
- 23 Appendicular artery
- 24 Vermiform appendix

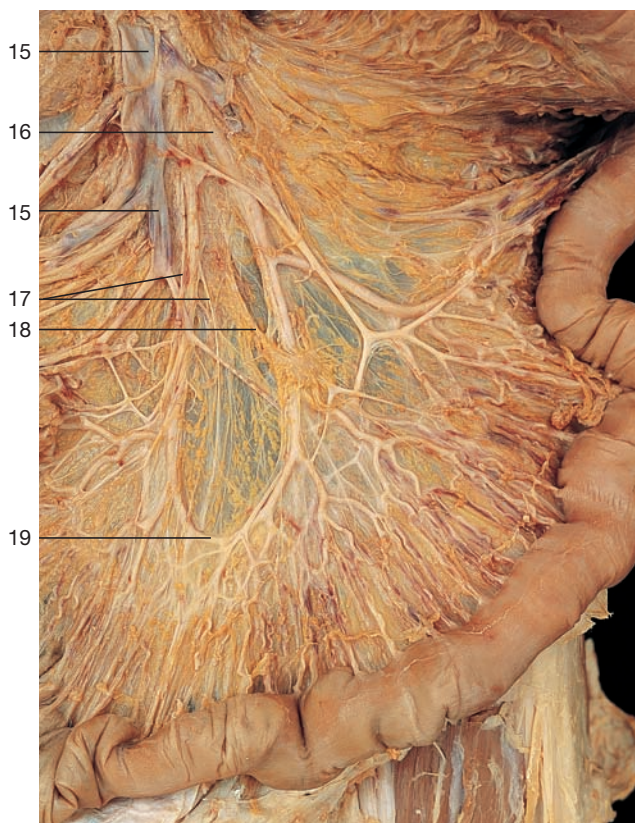
Vessels of upper abdominal organs and small intestine (anterior aspect). Dissection of superior mesenteric artery and vein. Greater omentum and transverse colon are reflected.



Arteries of upper abdominal organs and small intestine (anterior aspect). Main branches of superior mesenteric artery.



Vessels of upper abdominal organs and small intestine (anterior aspect). Dissection of superior mesenteric vein. The liver is dissected and elevated.



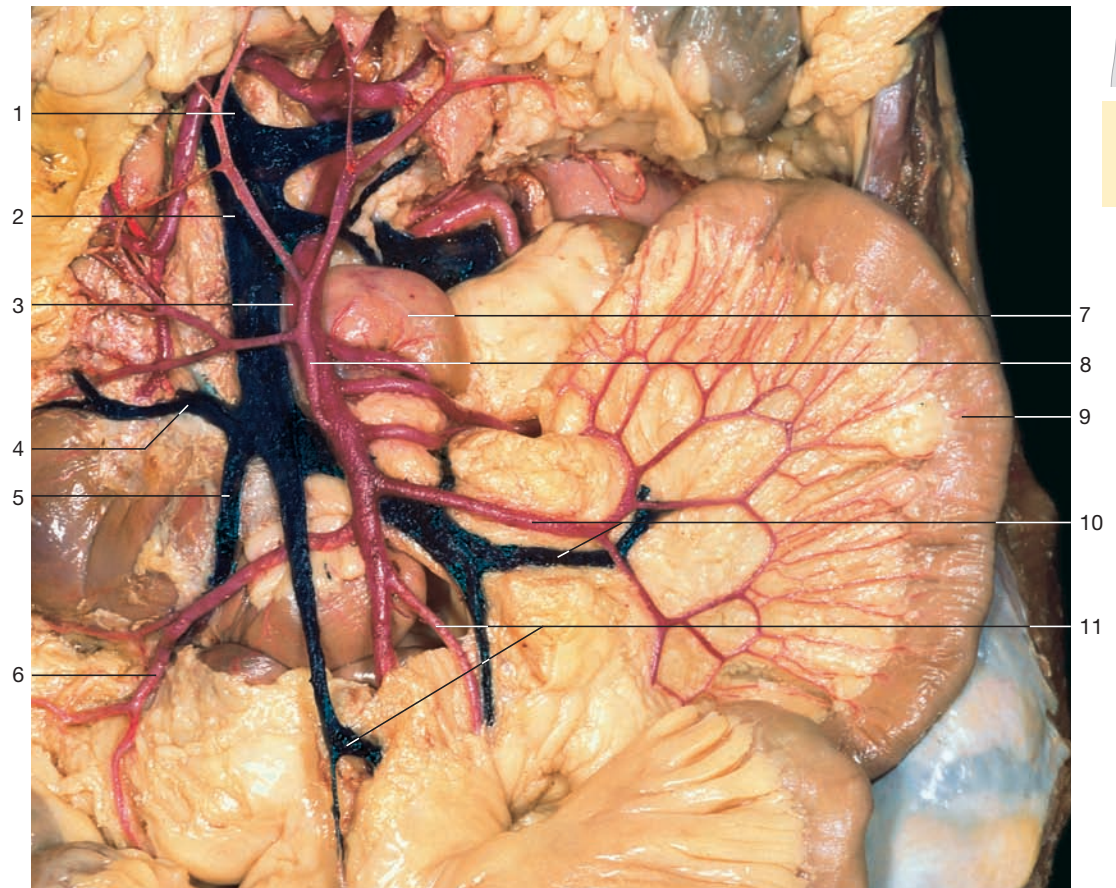
- 1 Liver
- 2 Hepatic artery proper
- 3 Hepatic duct
- 4 Gallbladder
- 5 Major duodenal papilla
- 6 Apex of the heart
- 7 Diaphragm
- 8 Common hepatic artery
- 9 Inferior vena cava
- 10 Pancreas
- 11 Stomach
- 12 Gastro-omental (gastro-epiploic) artery
- 13 Superior mesenteric vein
- 14 Small intestine
- 15 Jejunal vein
- 16 Superior mesenteric artery
- 17 Intestinal lymphatic vessels
- 18 Superior mesenteric plexus
- 19 Branches of superior mesenteric artery

Blood and lymphatic vessels of the small intestine (anterior aspect). Note the arterial arch of the mesenteric artery adjacent the small intestine.

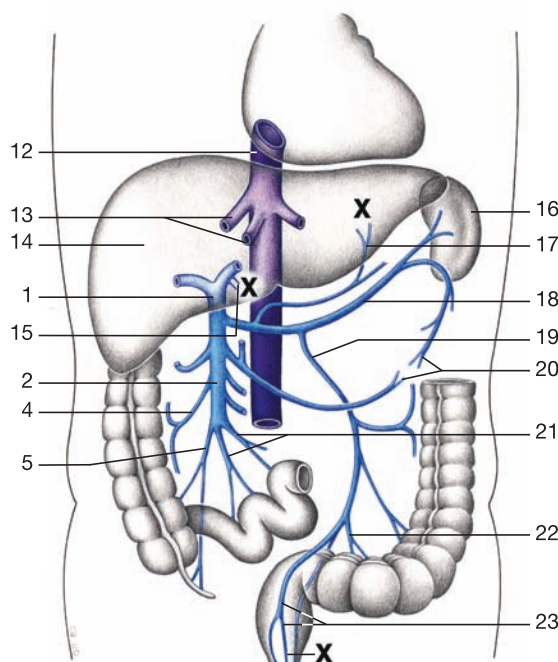


Vessels of upper abdominal organs and small intestine (anterior aspect). Stomach and omentum majus have been removed. The liver is elevated.

- | | | |
|-----------------------------|------------------------------|---|
| 1 Diaphragm | 7 Superior mesenteric vein | 13 Pancreas |
| 2 Liver | 8 Apex of the heart | 14 Superior mesenteric artery |
| 3 Proper hepatic artery | 9 Esophagus (abdominal part) | 15 Small intestine |
| 4 Duodenum | 10 Spleen | 16 Inguinal ligament and femoral artery |
| 5 Gallbladder | 11 Splenic artery | |
| 6 Inferior duodenal flexure | 12 Tail of pancreas | |



Dissection of portal venous system (anterior aspect). Blue = tributaries of portal vein; red = branches of superior mesenteric artery.



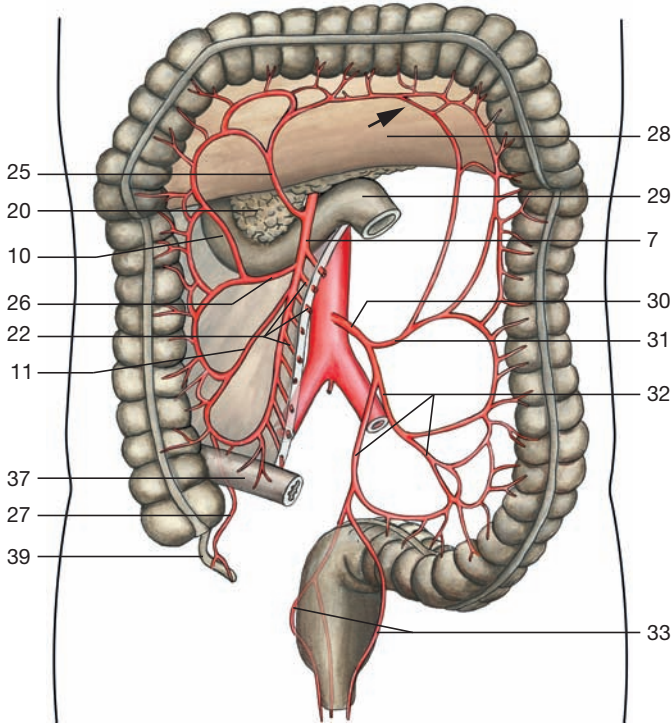
Main tributaries of portal vein (anterior aspect). Blue = tributaries of portal vein; violet = inferior vena cava; X = sites of portocaval anastomoses.

- 1 Portal vein
- 2 Superior mesenteric vein
- 3 Superior mesenteric artery
- 4 Right colic vein
- 5 Ileocolic vein
- 6 Ileocolic artery
- 7 Duodenojejunal flexure
- 8 Middle colic artery
- 9 Jejunum
- 10 Jejunal arteries and veins
- 11 Ileal arteries and veins
- 12 Inferior vena cava
- 13 Hepatic veins
- 14 Liver
- 15 Para-umbilical veins (located within the ligamentum teres)
- 16 Spleen
- 17 Left gastric vein with esophageal branches
- 18 Splenic vein
- 19 Inferior mesenteric vein
- 20 Gastro-omental veins
- 21 Ileal veins
- 22 Sigmoid veins
- 23 Superior rectal vein

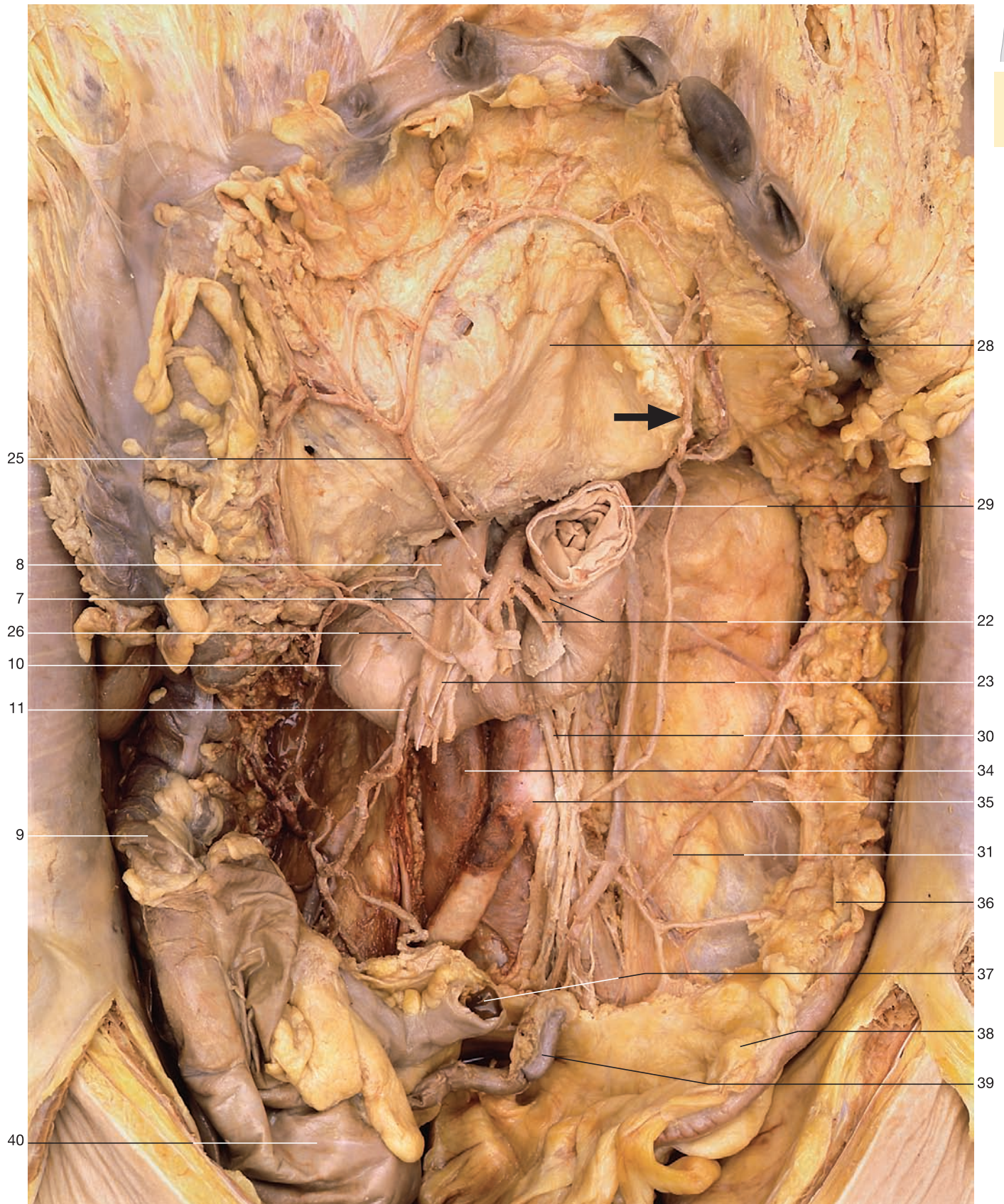


Superior mesenteric artery and vein in relation to pancreas and duodenum (anterior aspect). Stomach and transverse colon have been removed and the liver elevated. Note the location of the spleen. A yellow probe is inserted through the omental foramen.

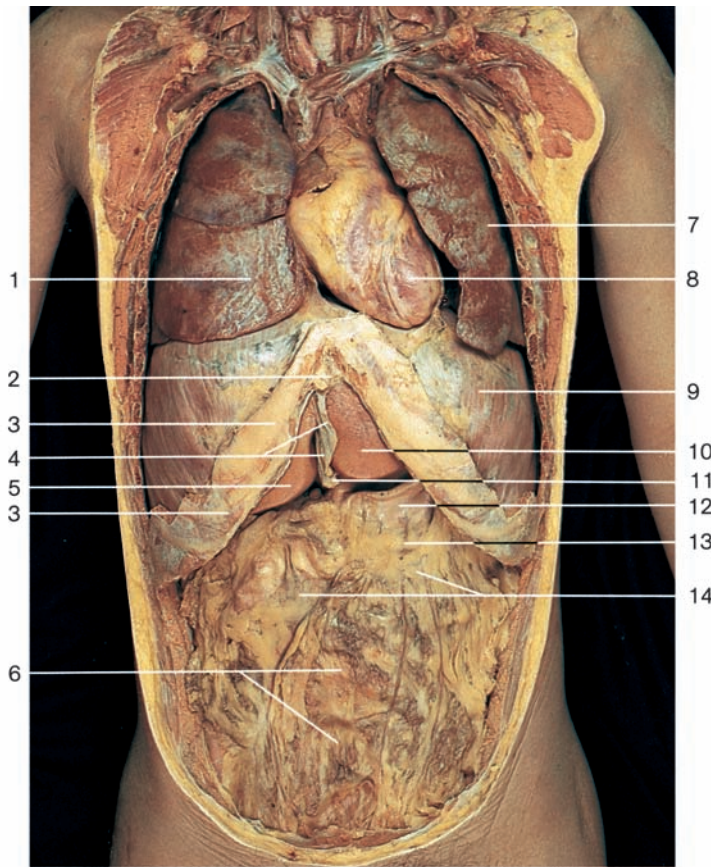
- 1 Ligamentum teres
- 2 Liver
- 3 Gallbladder and common bile duct
- 4 Hepatic artery proper and portal vein
- 5 Right gastric artery and pylorus
- 6 Gastroduodenal artery
- 7 Superior mesenteric artery
- 8 Superior mesenteric vein
- 9 Ascending colon
- 10 Duodenum
- 11 Ileocolic artery
- 12 Lymph nodes
- 13 Ileum
- 14 Cecum
- 15 Left lobe of liver
- 16 Caudate lobe of liver
- 17 Spleen
- 18 Left gastric artery
- 19 Splenic artery
- 20 Pancreas
- 21 Left colic flexure (cut)
- 22 Jejunal arteries
- 23 Ileal arteries
- 24 Jejunum
- 25 Middle colic artery
- 26 Right colic artery
- 27 Appendicular artery
- 28 Transverse mesocolon
- 29 Duodenojejunal flexure
- 30 Inferior mesenteric artery
- 31 Left colic artery
- 32 Sigmoid arteries
- 33 Superior rectal arteries
- 34 Inferior vena cava
- 35 Abdominal aorta
- 36 Descending colon
- 37 Ileum
- 38 Sigmoid colon
- 39 Vermiform appendix
- 40 Cecum



Main branches of superior and inferior mesenteric arteries (anterior aspect). Arrow: Riolan's anastomosis.

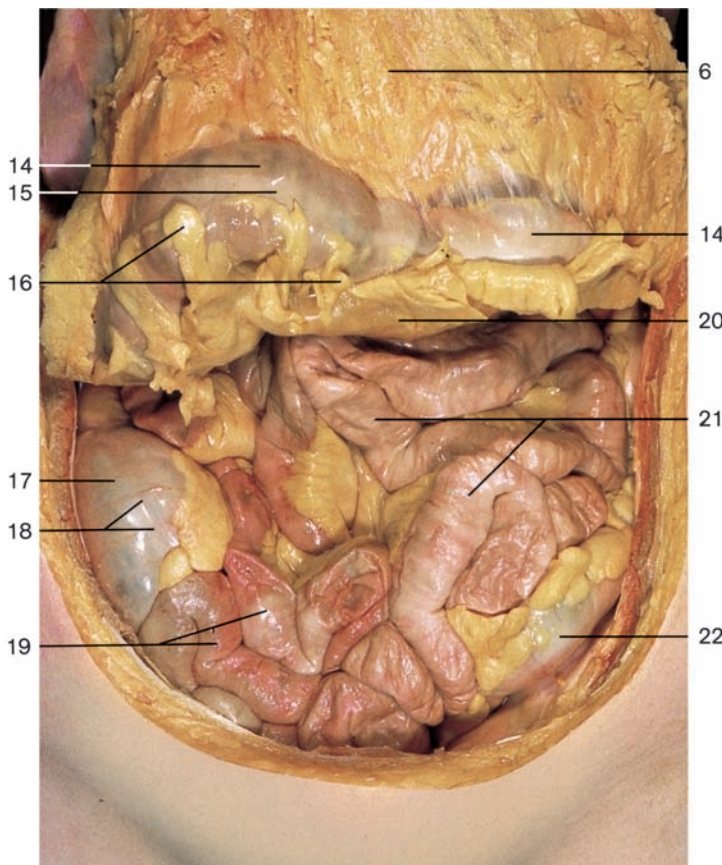


Vessels of the retroperitoneal organs (anterior aspect). Dissection of the inferior mesenteric artery and its anastomosis with the middle colic artery (arrow: Riolan's anastomosis). Greater omentum and transverse colon have been reflected and the intestine partly removed. The normally retroceally located vermiform appendix has been replaced anteriorly. The right common iliac artery is partly obstructed by a blood thrombus.



- 1 Middle lobe of right lung
- 2 Xiphoid process
- 3 Costal margin
- 4 Falciform ligament of liver
- 5 Quadrate lobe of liver
- 6 Greater omentum
- 7 Upper lobe of left lung
- 8 Heart
- 9 Diaphragm
- 10 Left lobe of liver
- 11 Ligamentum teres
- 12 Stomach
- 13 Gastrocolic ligament
- 14 Transverse colon
- 15 Taenia coli
- 16 Appendices epiploicae
- 17 Cecum
- 18 Taenia coli
- 19 Ileum
- 20 Transverse mesocolon
- 21 Jejunum
- 22 Sigmoid colon
- 23 Position of root of mesentery
- 24 Vermiform appendix
- 25 Duodenojejunal flexure
- 26 Mesentery

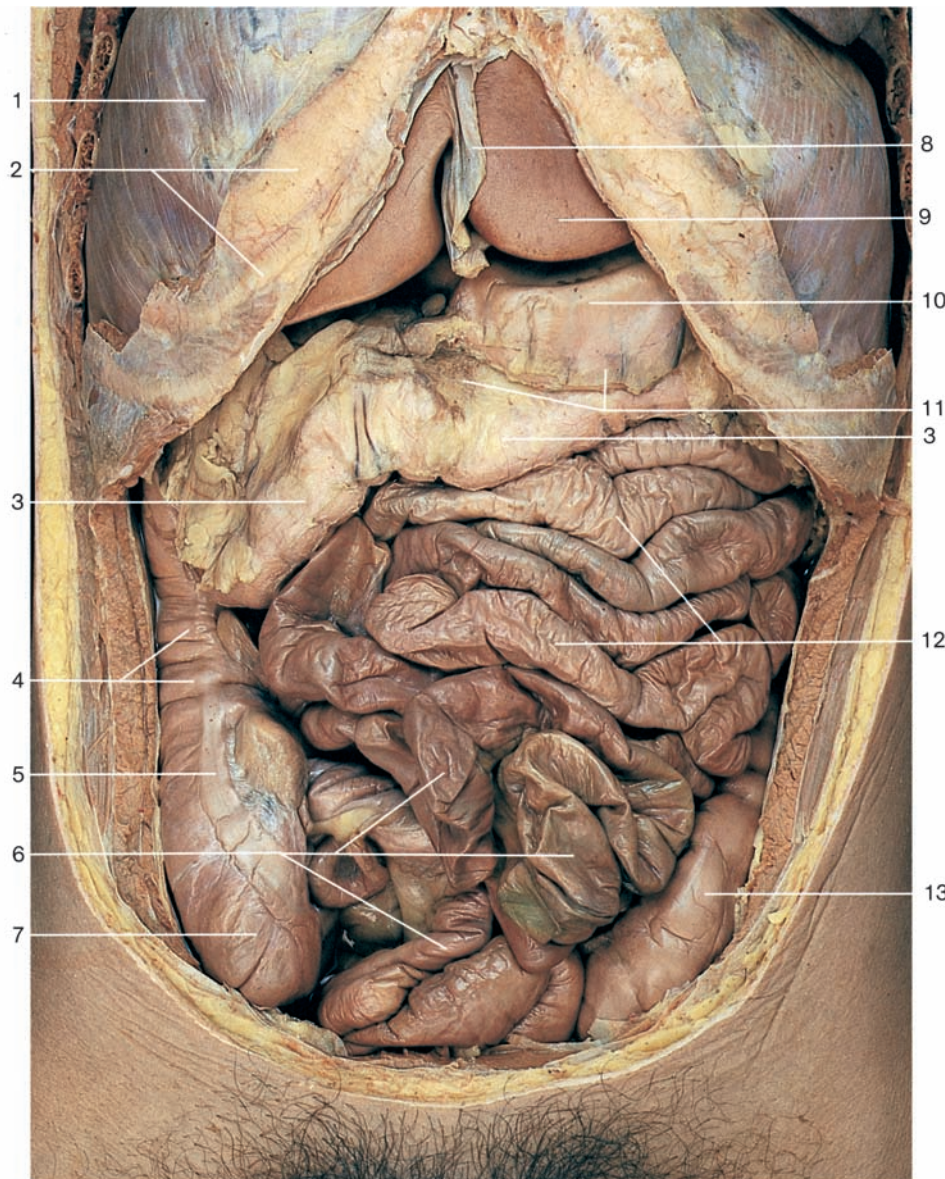
Abdominal organs (anterior aspect). The anterior thoracic and abdominal walls have been removed.



Abdominal organs (anterior aspect). The greater omentum, which is fixed to the transverse colon, has been raised.



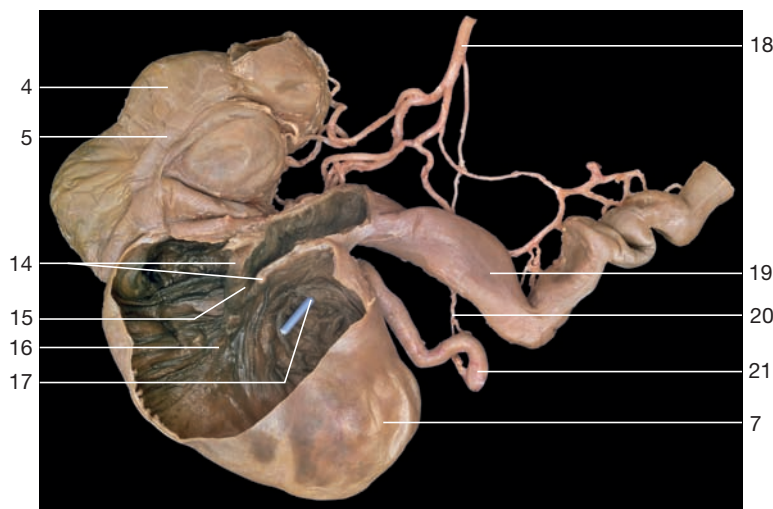
Abdominal organs (anterior aspect). The transverse colon has been reflected.



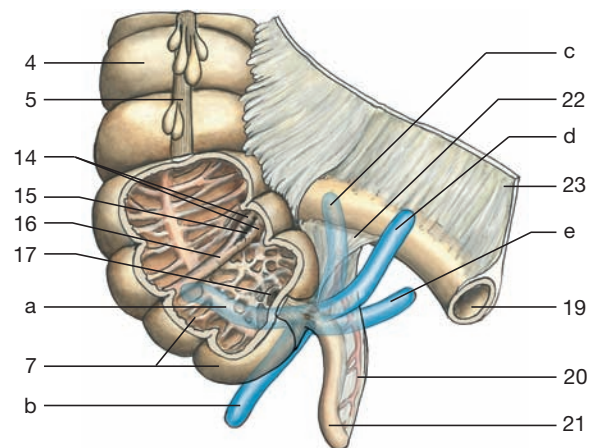
- 1 Diaphragm
- 2 Costal margin
- 3 Transverse colon
- 4 Ascending colon with haustra
- 5 Free taenia of cecum
- 6 Ileum
- 7 Cecum
- 8 Falciform ligament of liver
- 9 Liver
- 10 Stomach
- 11 Gastrocolic ligament
- 12 Jejunum
- 13 Sigmoid colon
- 14 Ileocecal valve
- 15 Ileal ostium
- 16 Frenulum of ileal opening
- 17 Ostium of vermiform appendix (probe in the dissection)
- 18 Ileocolic artery
- 19 Terminal ileum
- 20 Appendicular artery
- 21 Vermiform appendix
- 22 Meso-appendix
- 23 Mesentery



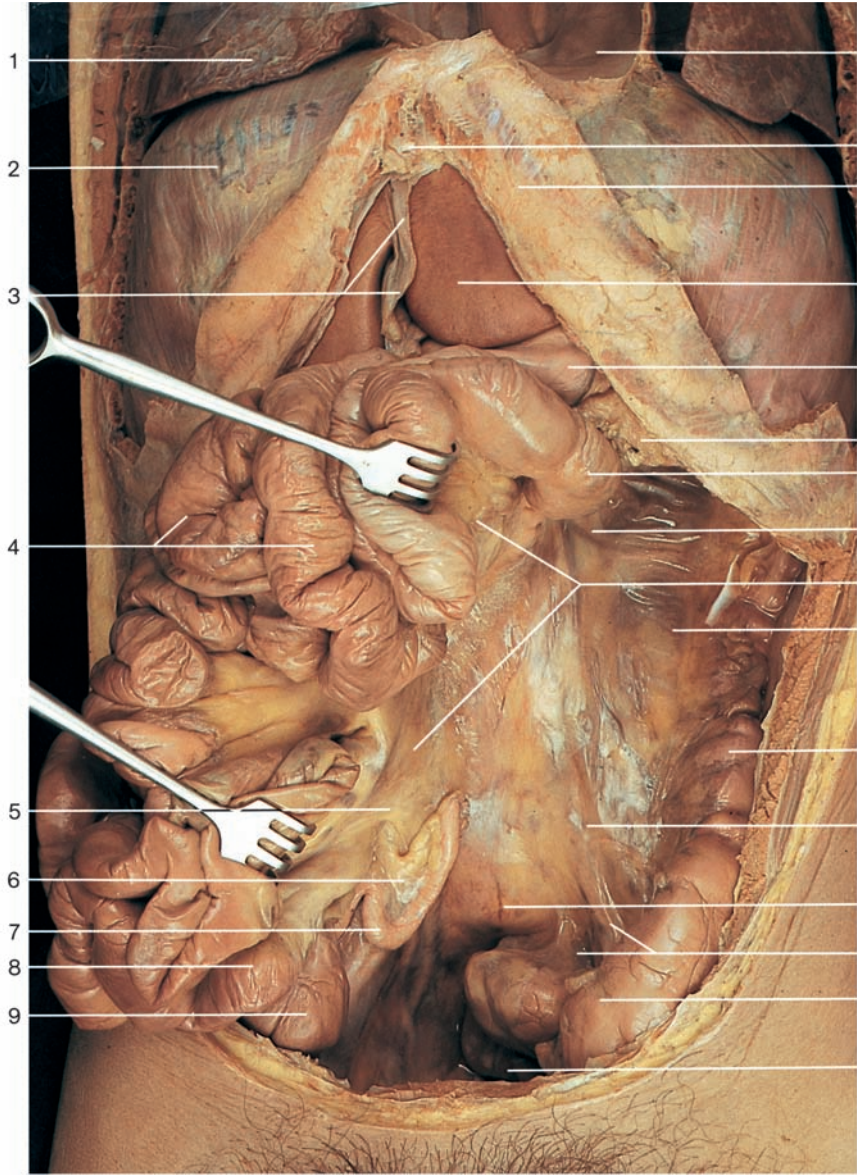
Abdominal organs (anterior aspect). The greater omentum has been removed.



Ascending colon, cecum, and vermiform appendix. The cecum has been opened. Note the probe in the entrance of the vermiform appendix.

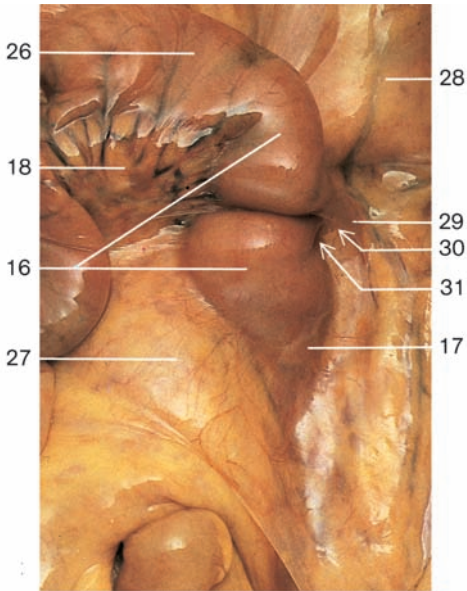


Variations in the position of the vermiform appendix. The cecum has been opened to show the ileal opening. a = retrocecal; b = paracecal; c = retro-ileal; d = pre-ileal; e = subcecal.

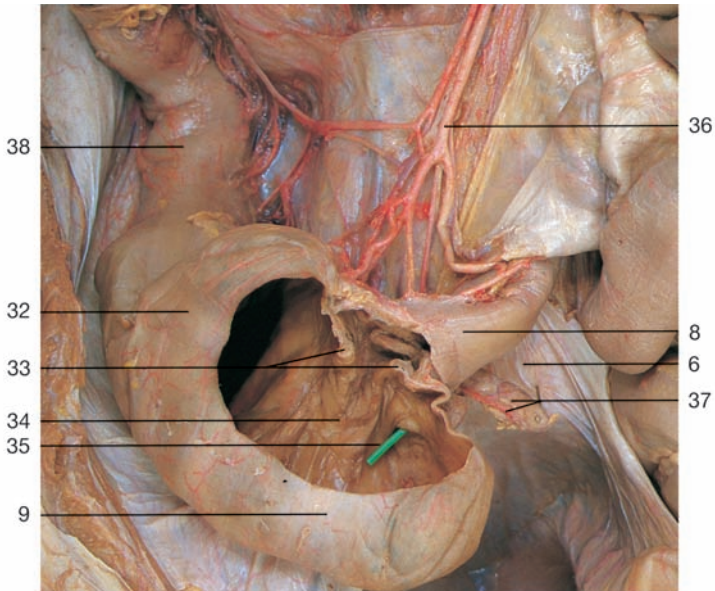


- 1 Lung
- 2 Diaphragm
- 3 Falciform ligament of liver
- 4 Jejunum
- 5 Ileocecal fold
- 6 Meso-appendix
- 7 Vermiform appendix
- 8 Terminal ileum
- 9 Cecum
- 10 Pericardial sac
- 11 Xiphoid process
- 12 Costal margin
- 13 Liver
- 14 Stomach
- 15 Transverse colon
- 16 Duodenojejunal flexure
- 17 Inferior duodenal fold
- 18 Mesentery
- 19 Position of left kidney
- 20 Descending colon
- 21 Position of left common iliac artery
- 22 Sacral promontory
- 23 Sigmoid mesocolon
- 24 Sigmoid colon
- 25 Rectum

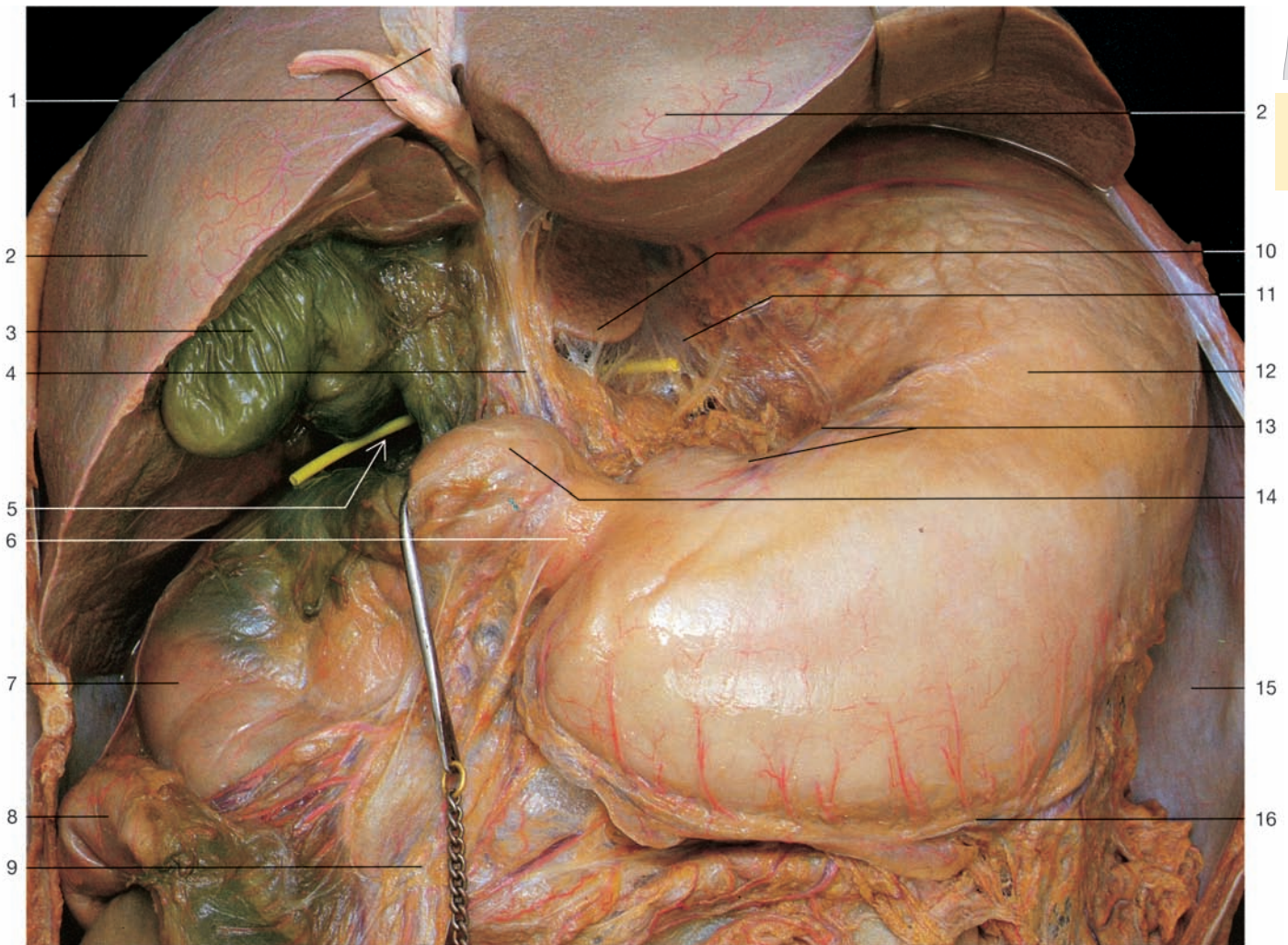
Abdominal organs with mesenteries (anterior aspect). The small intestine has been reflected laterally to demonstrate the mesentery.



Duodenojejunal flexure
(enlargement of preceding figure).

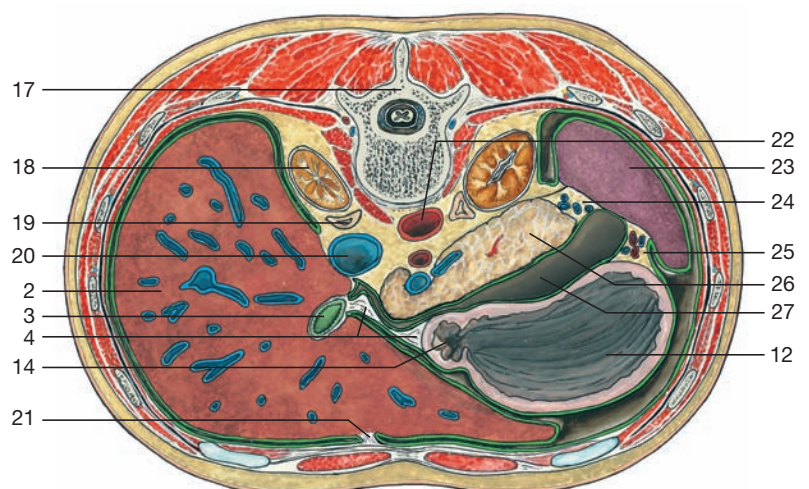


Ileocecal valve (anterior aspect). Cecum and terminal part of the ileum have been opened.

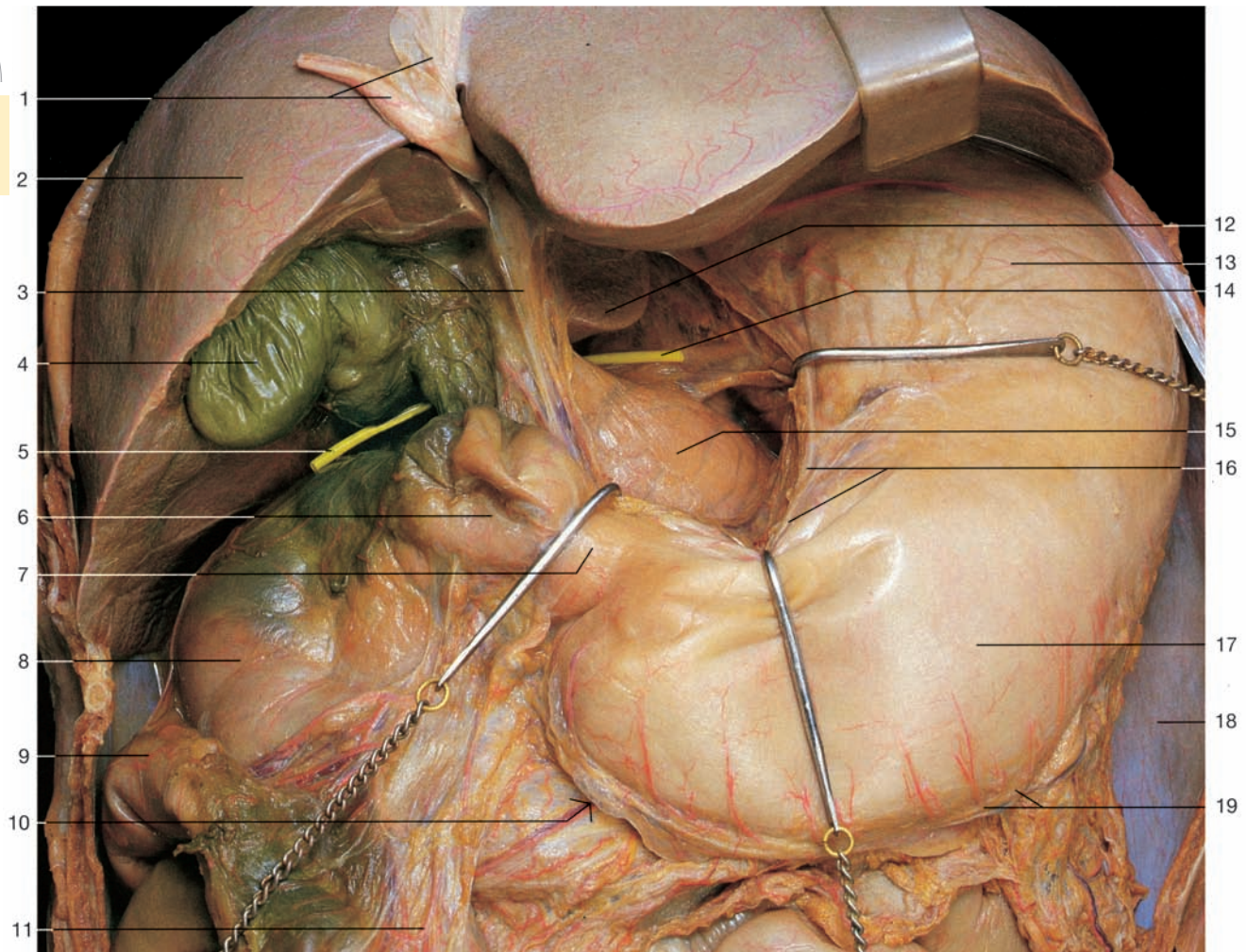


Upper abdominal organs (anterior aspect). Thorax and anterior part of diaphragm have been removed and the liver raised to display the **lesser omentum**. A probe has been inserted into the epiploic foramen and lesser sac.

- 1 Falciform ligament and ligamentum teres
- 2 Liver
- 3 Gallbladder (fundus)
- 4 Hepatoduodenal ligament
- 5 Epiploic foramen (probe)
- 6 Pylorus
- 7 Descending part of duodenum
- 8 Right colic flexure
- 9 Gastrocolic ligament
- 10 Caudate lobe of liver (behind lesser omentum)
- 11 Lesser omentum
- 12 Stomach
- 13 Lesser curvature of stomach
- 14 Superior part of duodenum
- 15 Diaphragm
- 16 Greater curvature of stomach with gastro-omental vessels
- 17 Twelfth thoracic vertebra
- 18 Right kidney
- 19 Right suprarenal gland
- 20 Inferior vena cava
- 21 Falciform ligament of liver
- 22 Abdominal aorta
- 23 Spleen
- 24 Lienorenal ligament
- 25 Gastrosplenic ligament
- 26 Pancreas
- 27 Lesser sac (omental bursa)

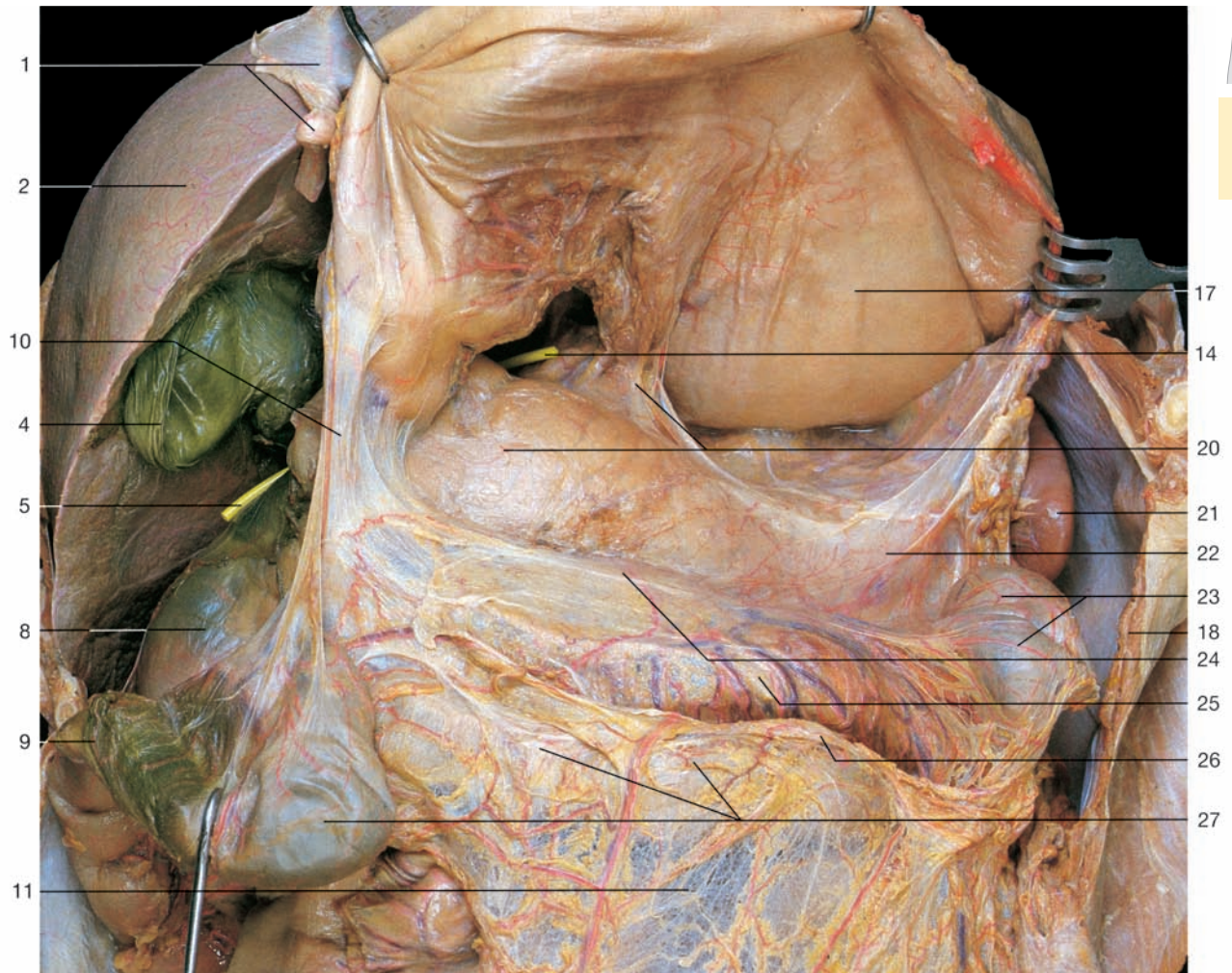


Horizontal section through the lesser sac above the level of epiploic foramen (superior aspect).

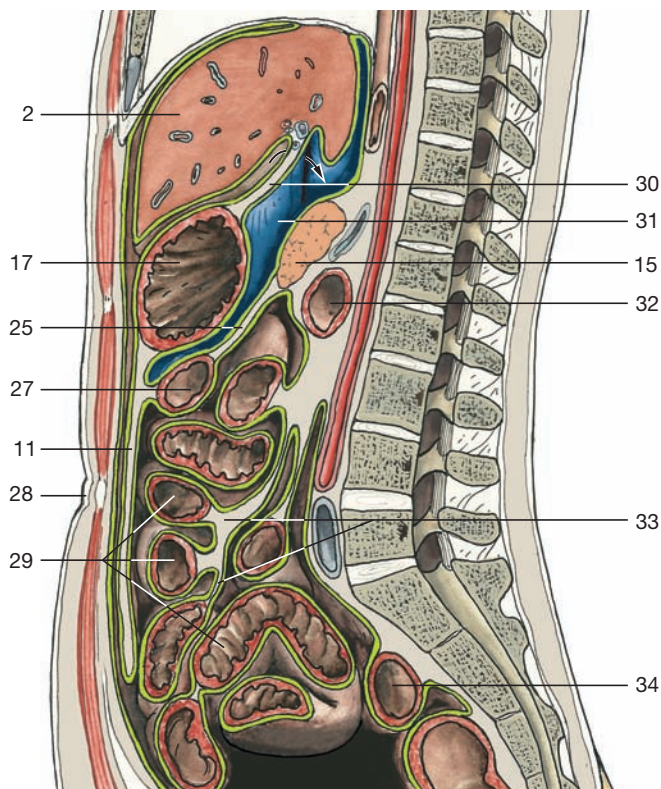


Upper abdominal organs (anterior aspect). Lesser sac. The lesser omentum has been partly removed and the liver and stomach have been slightly reflected.

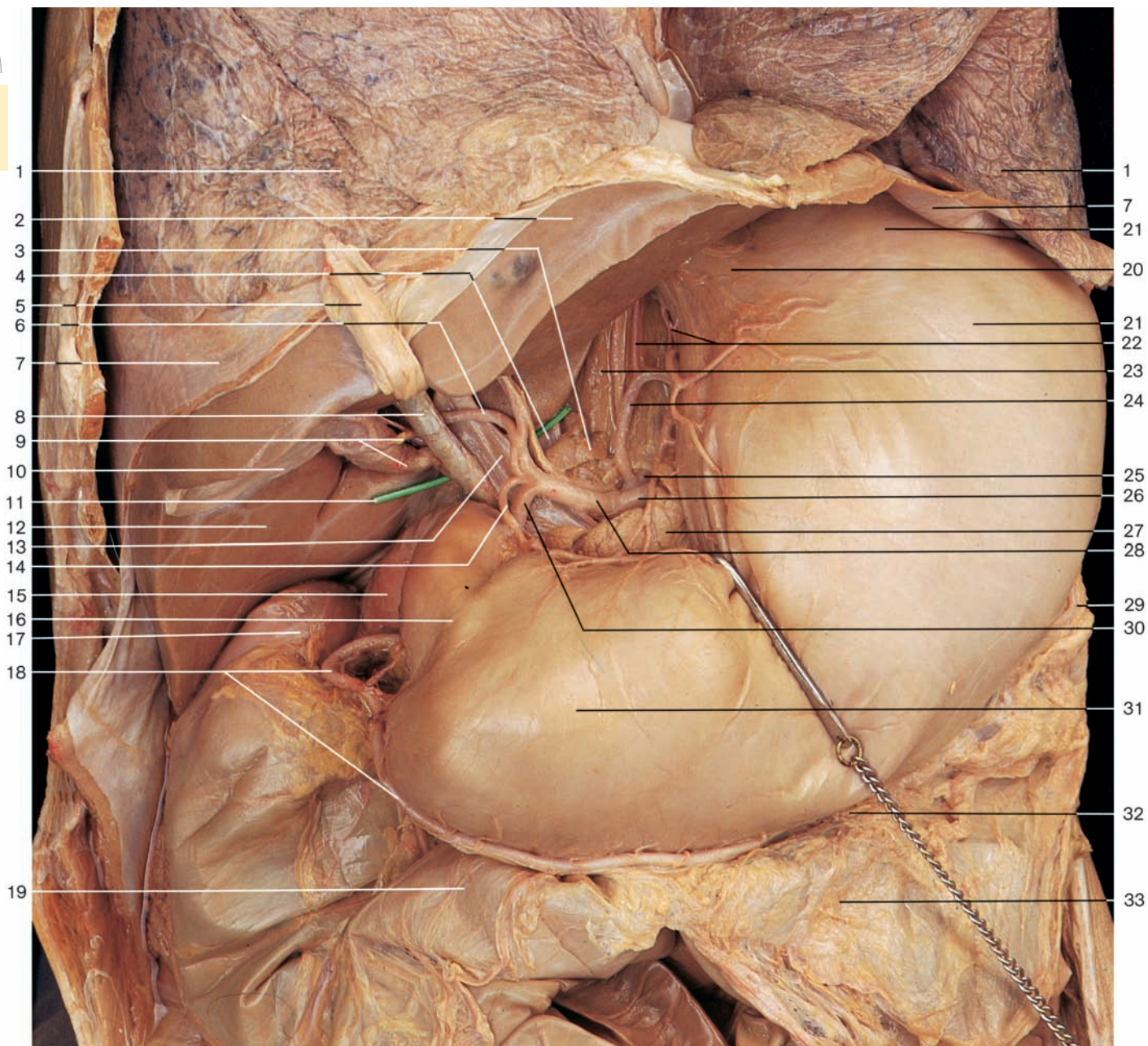
- | | |
|---|--|
| 1 Falciform ligament and ligamentum teres | 18 Diaphragm |
| 2 Liver | 19 Greater curvature with gastro-omental vessels |
| 3 Hepatoduodenal ligament | 20 Head of pancreas and gastropancreatic fold |
| 4 Gallbladder | 21 Spleen |
| 5 Probe within the epiploic foramen | 22 Tail of pancreas |
| 6 Superior part of duodenum | 23 Left colic flexure |
| 7 Pylorus | 24 Root of transverse mesocolon |
| 8 Descending part of duodenum | 25 Transverse mesocolon |
| 9 Right colic flexure | 26 Gastrocolic ligament (cut edge) |
| 10 Gastrocolic ligament | 27 Transverse colon |
| 11 Greater omentum | 28 Umbilicus |
| 12 Caudate lobe of liver | 29 Small intestine |
| 13 Fundus of stomach | 30 Lesser omentum |
| 14 Probe at the level of the vestibule of lesser sac (through epiploic foramen) | 31 Lesser sac (omental bursa) |
| 15 Head of pancreas | 32 Duodenum |
| 16 Lesser curvature of stomach | 33 Mesentery |
| 17 Body of stomach | 34 Sigmoid colon |



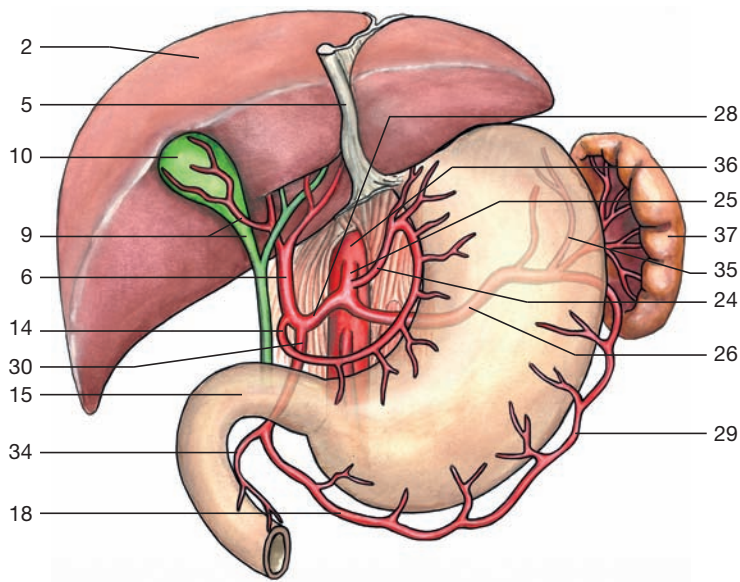
Upper abdominal organs (anterior aspect). Lesser sac. The gastrocolic ligament has been divided and the whole stomach raised to display the posterior wall of the lesser sac.



Midsagittal section through the abdominal cavity, demonstrating the site of lesser sac.
Blue = lesser sac (omental bursa); green = peritoneum;
arrow: entrance to the lesser sac (epiploic foramen).



Upper abdominal organs (anterior aspect). Celiac trunk. The lesser omentum has been removed and the lesser curvature of the stomach reflected to display the branches of the celiac trunk. The probe is situated within the epiploic foramen.



Arteries of upper abdominal organs and branches of celiac trunk.



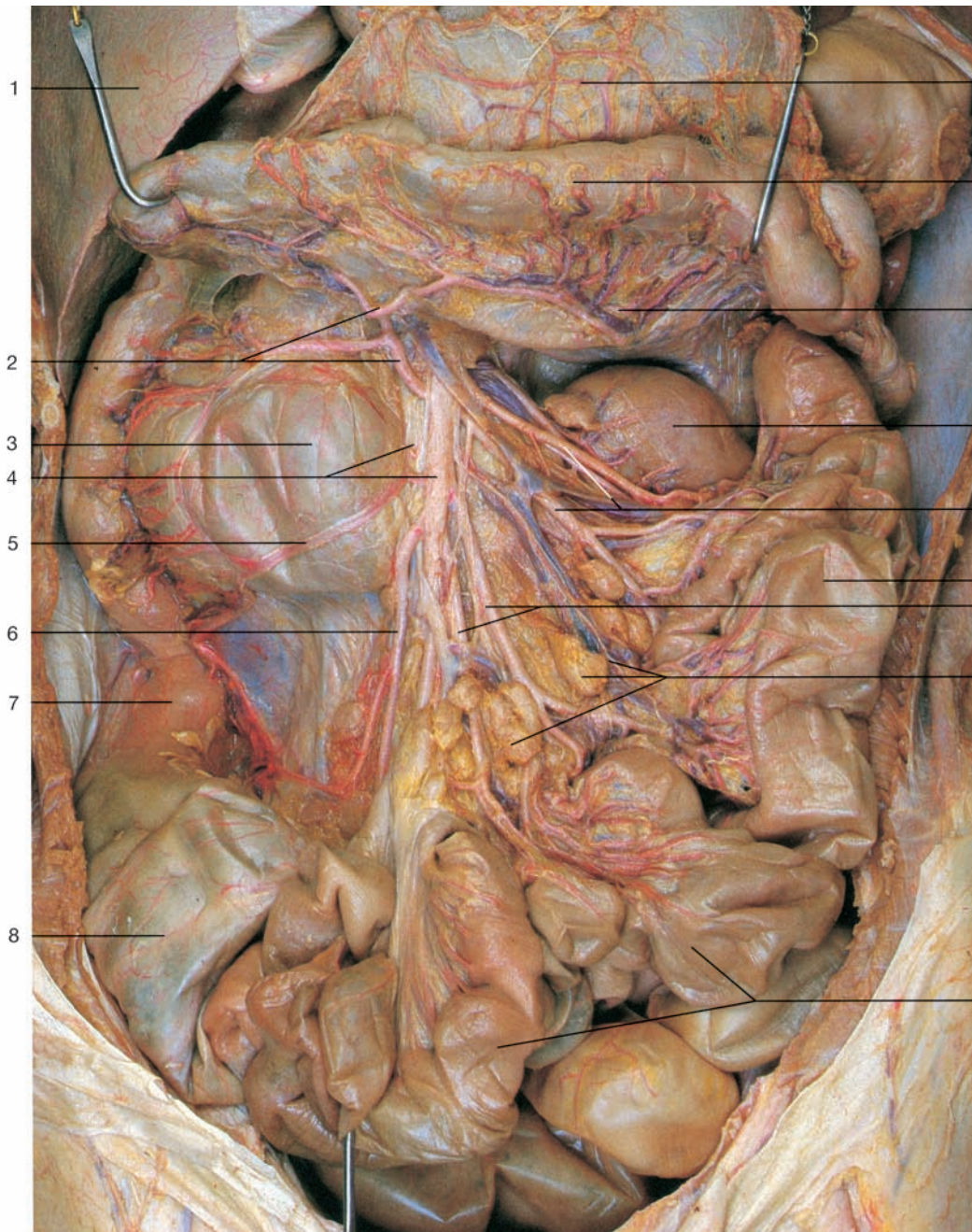
Upper abdominal organs (anterior aspect). Branches of celiac trunk; blood supply of liver, pancreas, and spleen. The stomach, superior part of duodenum, and celiac ganglion have been removed to reveal the anterior aspect of the posterior wall of the lesser sac (omental bursa) and the vessels and ducts of the hepatoduodenal ligament. The pancreas has been slightly reflected anteriorly.

- | | |
|--|---|
| 1 Lung | 23 Lumbar part of diaphragm |
| 2 Liver (visceral surface) | 24 Left gastric artery |
| 3 Lymph node | 25 Celiac trunk |
| 4 Inferior vena cava | 26 Splenic artery |
| 5 Ligamentum teres (reflected) | 27 Pancreas |
| 6 Right branch of hepatic artery proper | 28 Common hepatic artery |
| 7 Diaphragm | 29 Left gastro-omental (gastro-epiploic) artery |
| 8 Common hepatic duct (dilated) | 30 Gastroduodenal artery |
| 9 Cystic duct and artery | 31 Pyloric part of stomach |
| 10 Gallbladder | 32 Greater curvature of stomach |
| 11 Probe within the epiploic foramen | 33 Gastrocolic ligament |
| 12 Right lobe of liver | 34 Supraduodenal artery |
| 13 Portal vein | 35 Short gastric arteries |
| 14 Right gastric artery | 36 Aorta |
| 15 Duodenum | 37 Spleen |
| 16 Pylorus | 38 Caudate lobe of liver |
| 17 Right colic flexure | 39 Left branch of hepatic artery proper |
| 18 Right gastro-omental (gastro-epiploic) artery | 40 Descending part of duodenum (cut) |
| 19 Transverse colon | 41 Left inferior phrenic artery |
| 20 Abdominal part of esophagus (cardiac part of stomach) | 42 Suprarenal gland |
| 21 Fundus of stomach | 43 Kidney |
| 22 Esophageal branches of left gastric artery | 44 Transverse mesocolon |



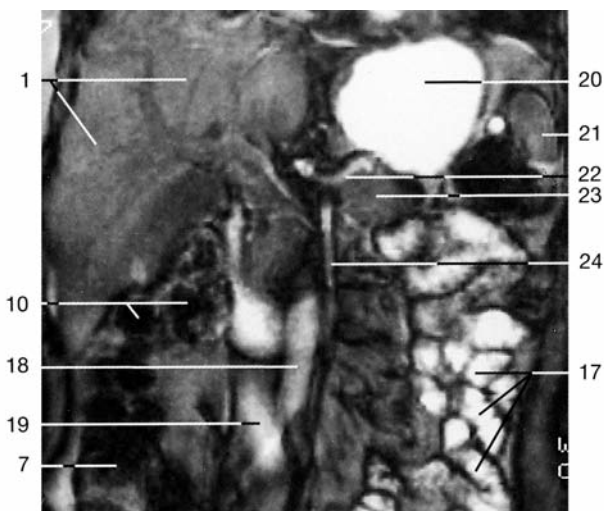
Lower abdominal organs (anterior aspect). Inferior mesenteric artery and autonomic plexus. The transverse colon with the mesocolon has been raised and the small intestine reflected.

- | | |
|---|--|
| 1 Liver | 12 Spleen |
| 2 Gallbladder | 13 Abdominal aorta |
| 3 Middle colic artery | 14 Left colic artery |
| 4 Jejunal artery | 15 Duodenojejunal flexure |
| 5 Inferior mesenteric artery | 16 Descending colon (free taenia of colon) |
| 6 Sympathetic nerves and ganglia | 17 Inferior mesenteric vein |
| 7 Right common iliac artery | 18 Superior hypogastric plexus |
| 8 Small intestine (ileum) | 19 Superior rectal artery |
| 9 Transverse colon (reflected) | 20 Sigmoid arteries |
| 10 Transverse mesocolon | 21 Peritoneum (cut edge) |
| 11 Anastomosis between middle and left colic artery | 22 Sigmoid mesocolon |
| | 23 Sigmoid colon |

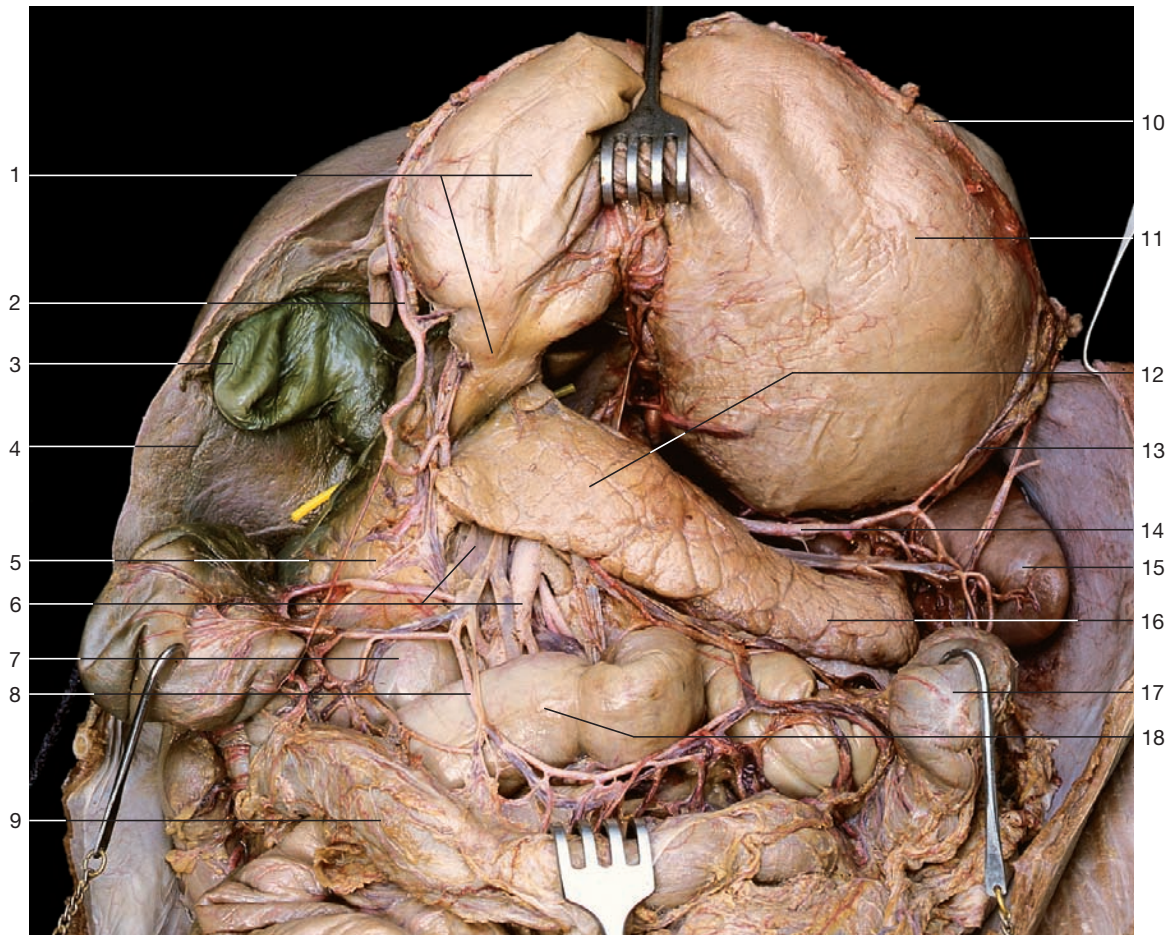


- 1 Liver
- 2 Middle colic artery
- 3 Horizontal part of duodenum (extended)
- 4 Superior mesenteric artery and vein
- 5 Right colic artery
- 6 Ileocolic artery
- 7 Ascending colon
- 8 Cecum
- 9 Greater omentum (reflected)
- 10 Transverse colon
- 11 Transverse mesocolon
- 12 Duodenojejunal flexure
- 13 Jejunal arteries
- 14 Jejunum
- 15 Ileal arteries
- 16 Mesenteric lymph nodes and lymph vessels
- 17 Ileum
- 18 Abdominal aorta
- 19 Inferior vena cava
- 20 Stomach
- 21 Spleen
- 22 Splenic artery
- 23 Head of pancreas
- 24 Superior mesenteric artery

Lower abdominal organs (anterior aspect). Superior mesenteric artery and mesenteric lymph nodes. The transverse colon has been reflected.

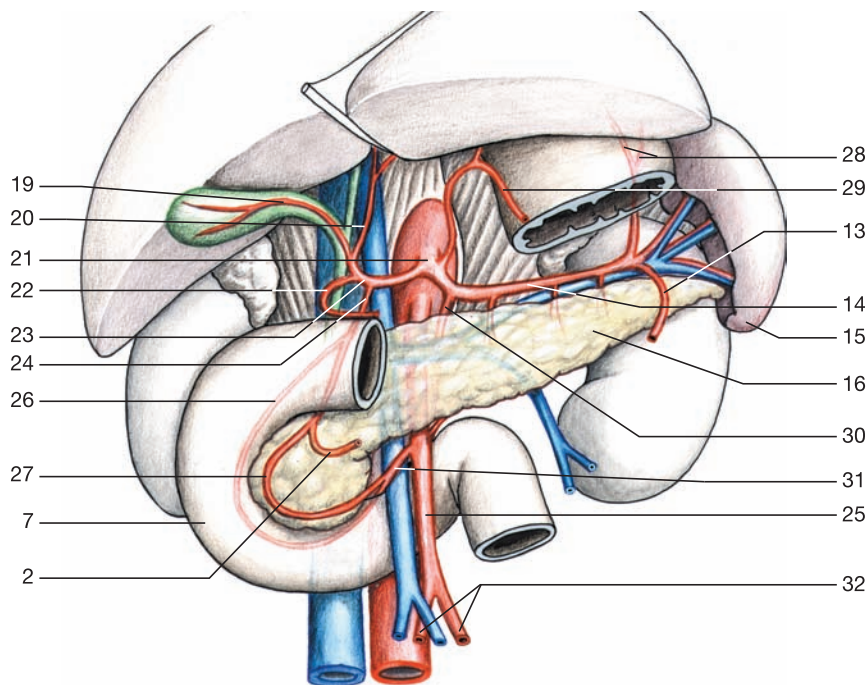


Frontal section through the abdominal cavity. The intestinal tract and vessels are filled with a paramagnetic substance (Gadolinium; MRI scan). (Prof. Rödl, Univ. Erlangen-Nuremberg, Germany.)



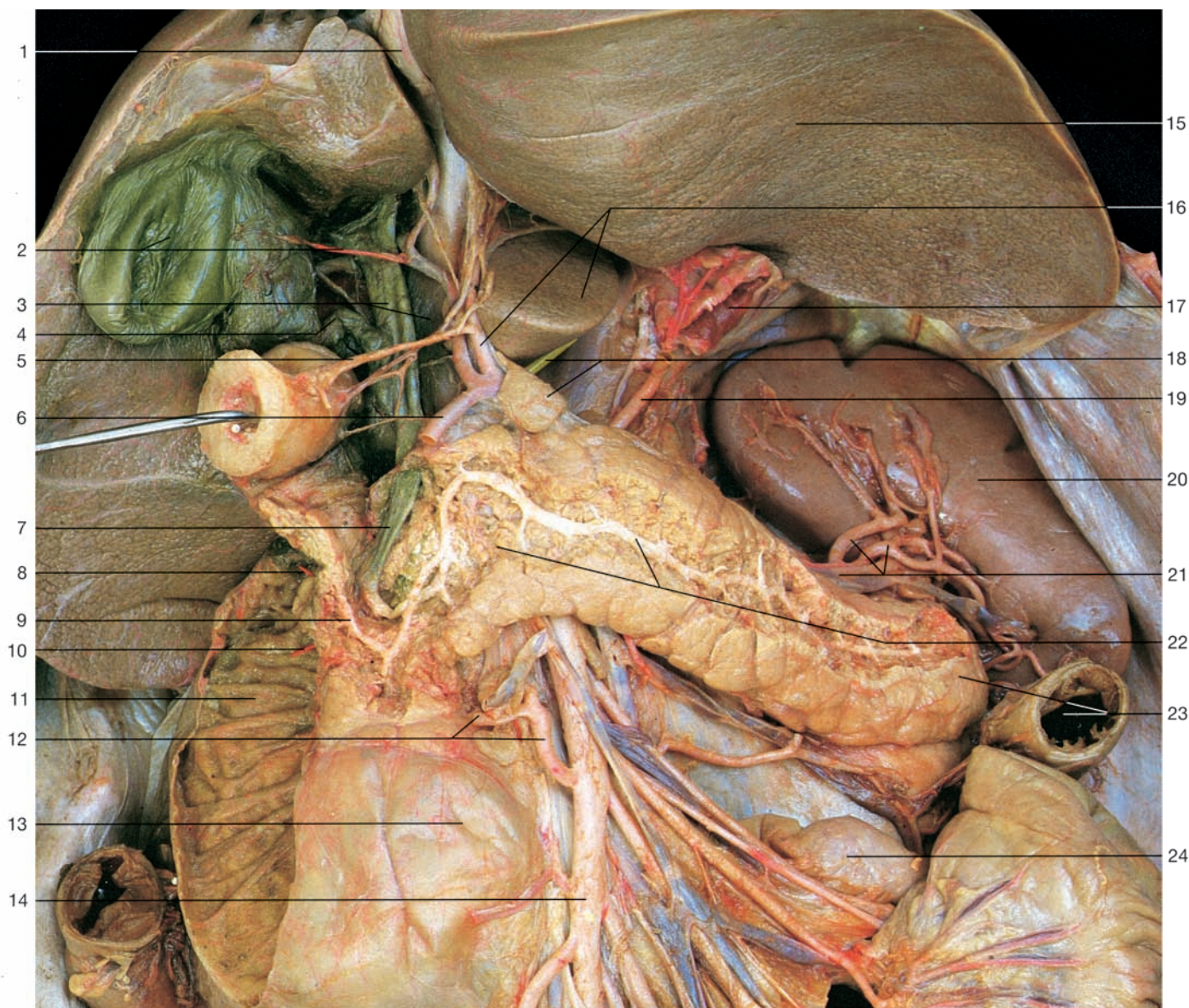
Posterior abdominal wall with pancreas and extrahepatic bile ducts in situ (anterior aspect).

The gastrocolic ligament has been divided and the transverse colon and the stomach replaced to display the pancreas and superior mesenteric vessels.



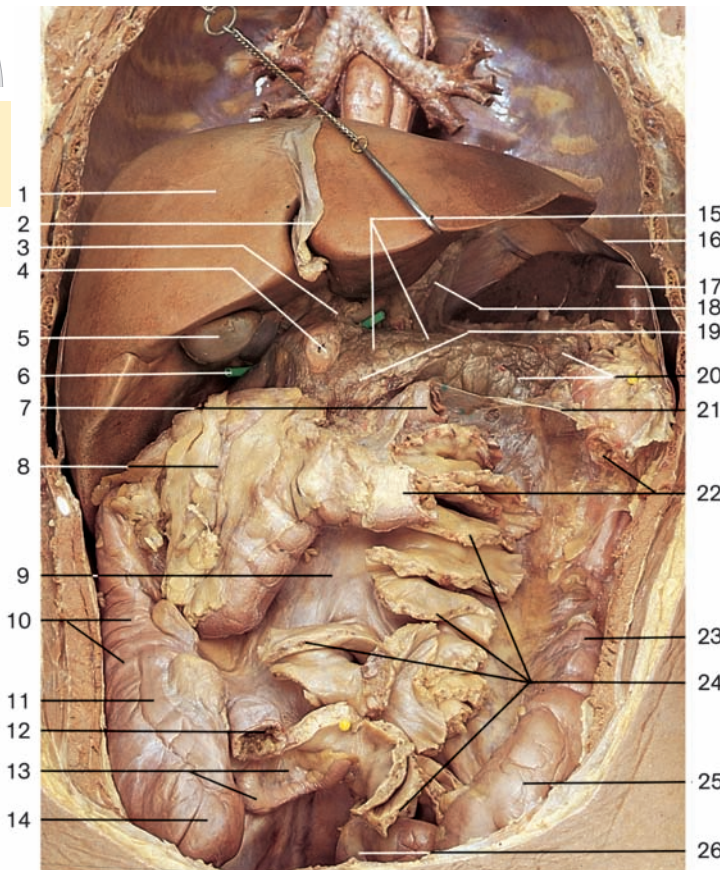
Blood supply of upper abdominal organs (compare with dissection depicted on following page). Note the branching of the celiac trunk not visible behind the body of pancreas, the main arterial supply of liver, spleen, pancreas, stomach, and duodenum.

- 1 Stomach (pyloric part) and pylorus
- 2 Right gastro-omental (gastro-epiploic) artery
- 3 Fundus of gallbladder
- 4 Liver (right lobe)
- 5 Head of pancreas
- 6 Superior mesenteric artery and vein
- 7 Duodenum
- 8 Middle colic artery
- 9 Transverse colon
- 10 Greater curvature of stomach (remnants of gastrocolic ligament)
- 11 Body of stomach
- 12 Body of pancreas
- 13 Left gastro-omental (gastro-epiploic) artery
- 14 Splenic artery
- 15 Spleen
- 16 Tail of pancreas
- 17 Left colic flexure
- 18 Jejunum
- 19 Cystic artery
- 20 Hepatic artery proper
- 21 Celiac trunk
- 22 Right gastric artery
- 23 Common hepatic artery
- 24 Gastroduodenal artery
- 25 Superior mesenteric artery
- 26 Superior posterior pancreaticoduodenal artery
- 27 Superior anterior pancreaticoduodenal artery
- 28 Short gastric arteries
- 29 Left gastric artery
- 30 Posterior pancreatic branch of splenic artery
- 31 Inferior pancreaticoduodenal artery
- 32 Jejunal arteries

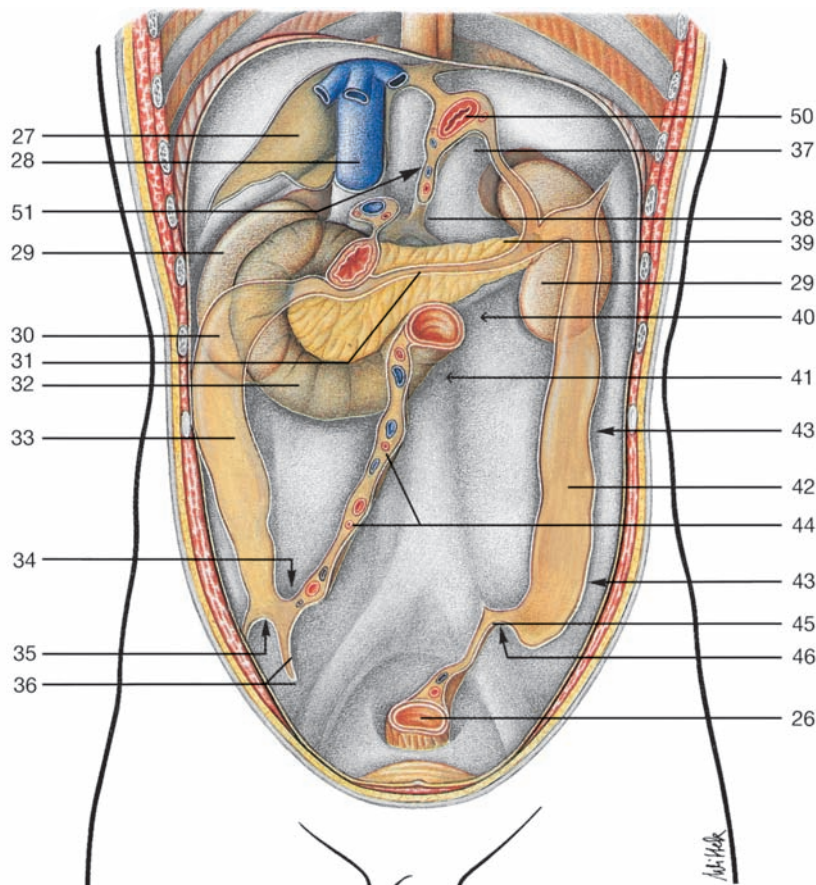


Posterior abdominal wall with pancreas, extrahepatic bile ducts, spleen, and liver with their vessels in situ (anterior aspect). The stomach has been removed, the liver elevated, and the descending part of duodenum fenestrated to display the openings of the pancreatic ducts. The pancreatic ducts were dissected. Note the location of superior mesenteric artery and vein between duodenum and pancreas.

- | | |
|--|--|
| 1 Ligamentum teres | 13 Horizontal part of duodenum (distended) |
| 2 Gallbladder and cystic artery | 14 Superior mesenteric artery |
| 3 Common hepatic duct and portal vein | 15 Liver (left lobe) |
| 4 Cystic duct | 16 Caudate lobe of liver and hepatic artery proper |
| 5 Right gastric artery (pylorus with superior part of duodenum, cut and reflected) | 17 Abdominal part of esophagus (cut) |
| 6 Gastroduodenal artery | 18 Probe in epiploic foramen and lymph node |
| 7 Common bile duct | 19 Left gastric artery |
| 8 Probe within the minor duodenal papilla | 20 Spleen |
| 9 Accessory pancreatic duct | 21 Splenic vein and branches of splenic artery |
| 10 Probe within the major duodenal papilla | 22 Main pancreatic duct and head of pancreas |
| 11 Descending part of duodenum (opened) | 23 Left colic flexure and tail of pancreas |
| 12 Middle colic artery and inferior pancreaticoduodenal artery | 24 Duodenojejunal flexure |

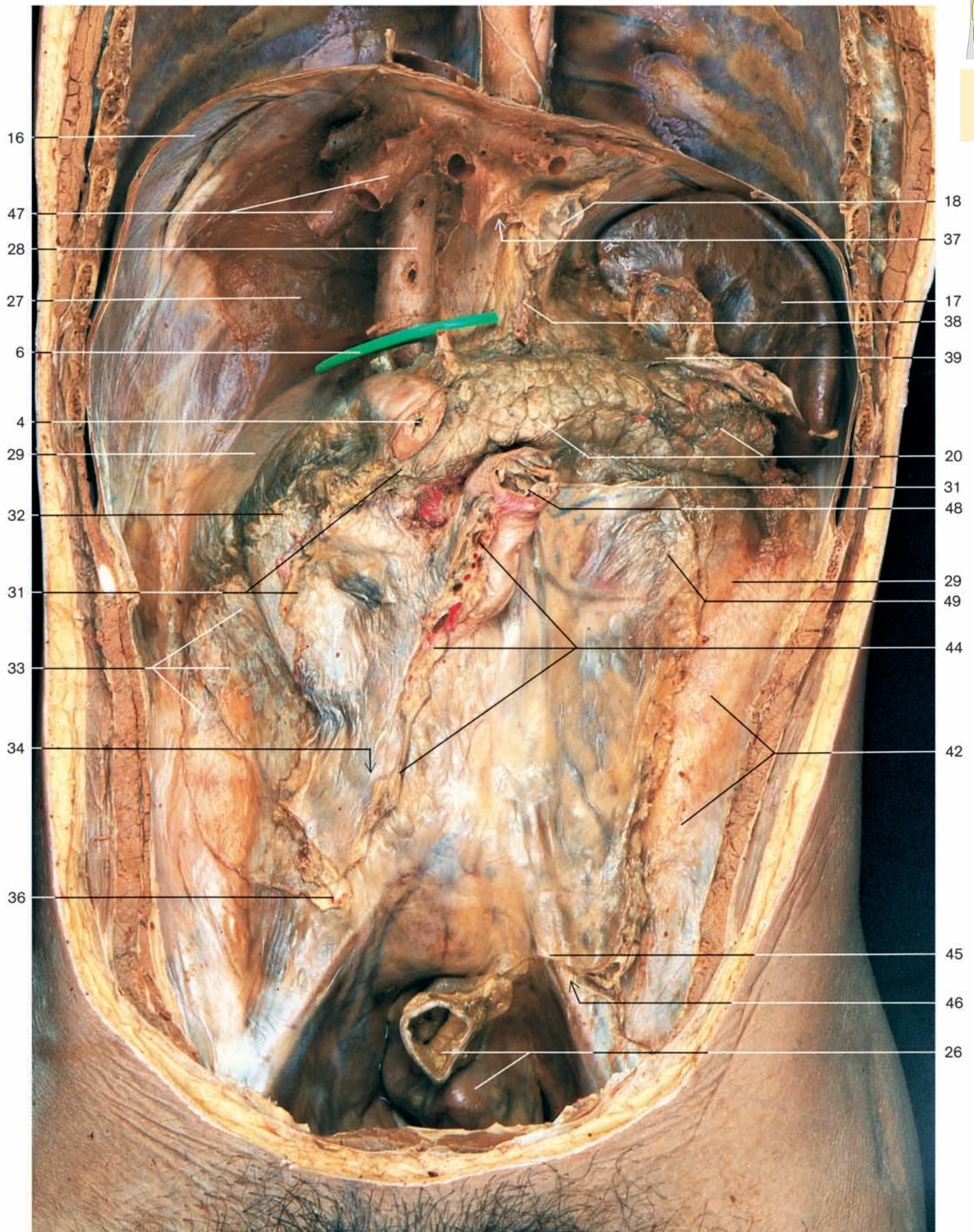


Abdominal cavity after removal of stomach, jejunum, ileum, and part of the transverse colon. The liver has been slightly raised.

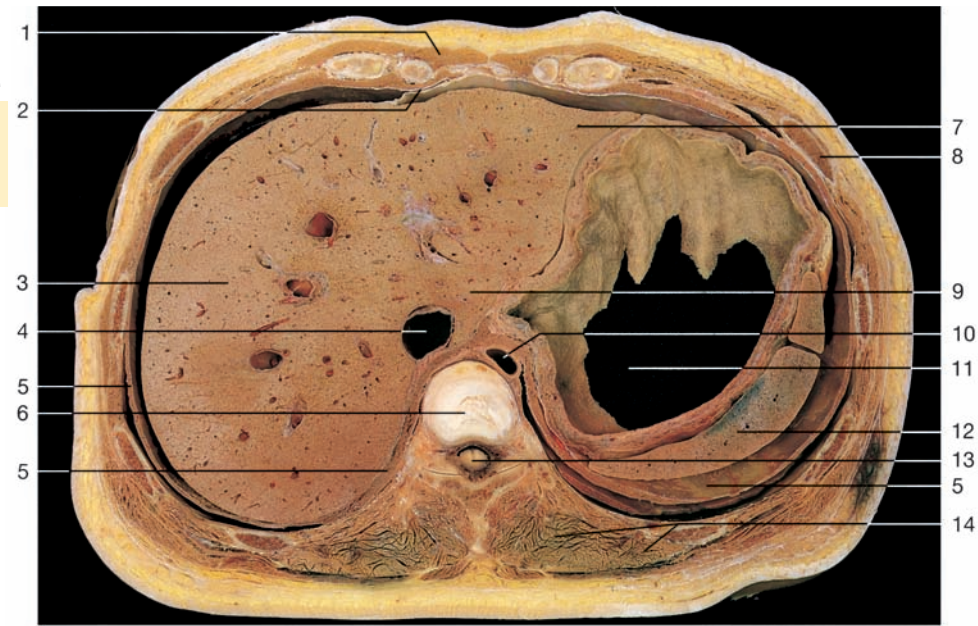


- 1 Liver
- 2 Falciform ligament
- 3 Hepatoduodenal ligament
- 4 Pylorus (divided)
- 5 Gallbladder
- 6 Probe within the epiploic foramen
- 7 Duodenojejunal flexure (divided)
- 8 Greater omentum
- 9 Root of mesentery
- 10 Ascending colon
- 11 Free colic taenia
- 12 End of ileum (divided)
- 13 Vermiform appendix with meso-appendix
- 14 Cecum
- 15 Pancreas and site of lesser sac
- 16 Diaphragm
- 17 Spleen
- 18 Cardia (part of stomach, divided)
- 19 Head of pancreas
- 20 Body and tail of pancreas
- 21 Transverse mesocolon
- 22 Transverse colon (divided)
- 23 Descending colon
- 24 Cut edge of mesentery
- 25 Sigmoid colon
- 26 Rectum
- 27 Attachment of bare area of liver
- 28 Inferior vena cava
- 29 Kidney
- 30 Attachment of right colic flexure
- 31 Root of transverse mesocolon
- 32 Junction between descending and horizontal parts of duodenum
- 33 Bare surface for ascending colon
- 34 Ileocecal recess
- 35 Retrocecal recess
- 36 Root of meso-appendix
- 37 Superior recess
- 38 Isthmus (opening)
- 39 Splenic recess
- 40 Superior duodenal recess
- 41 Inferior duodenal recess
- 42 Bare surface for descending colon
- 43 Paracolic recesses
- 44 Root of mesentery
- 45 Root of mesosigmoid
- 46 Intersigmoid recess
- 47 Hepatic veins
- 48 Duodenojejunal flexure
- 49 Attachment of left colic flexure
- 50 Esophagus
- 51 Entrance to lesser sac through the epiploic foramen (arrow)

Peritoneal reflections from organs and the position of root of mesentery and peritoneal recesses on the posterior abdominal wall.
Arrows: position of peritoneal recesses.

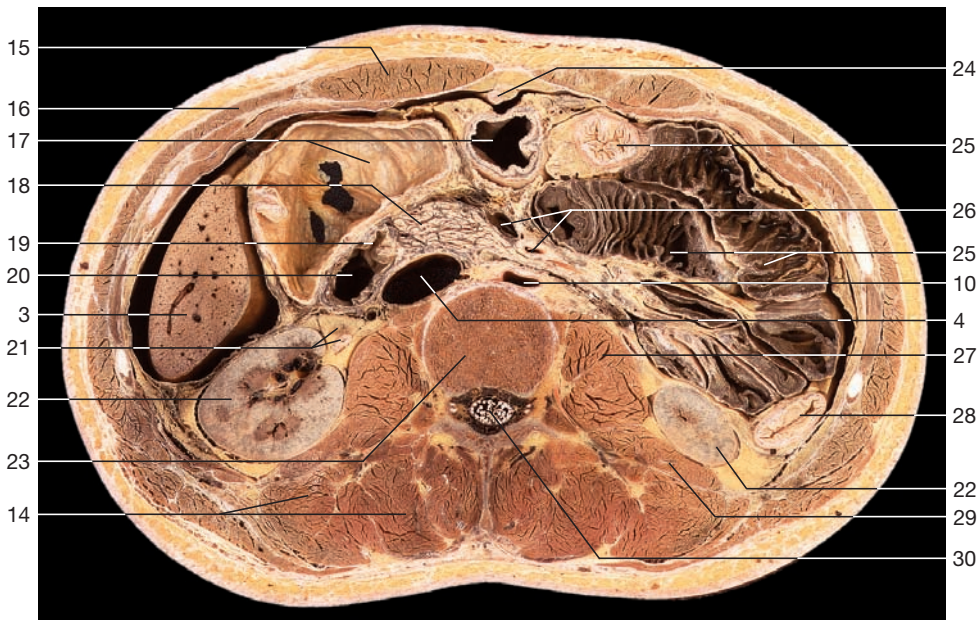


Peritoneal recesses on the posterior abdominal wall. The liver, stomach, jejunum, ileum, and colon have been removed. The duodenum, pancreas, and spleen have been left in place. Arrows: position of peritoneal recesses.

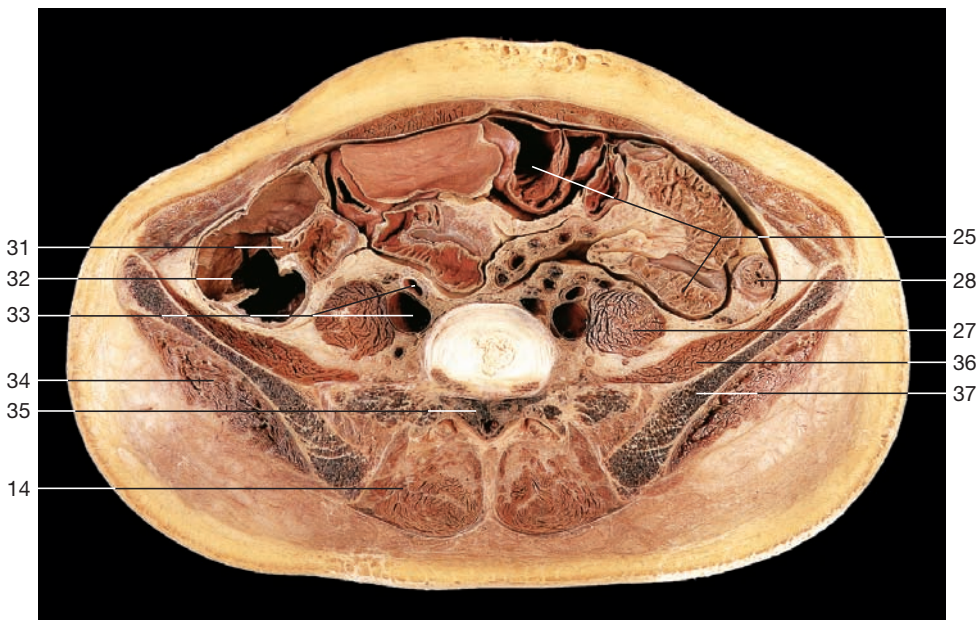


Horizontal section through the abdominal cavity. Section 1 (from below).

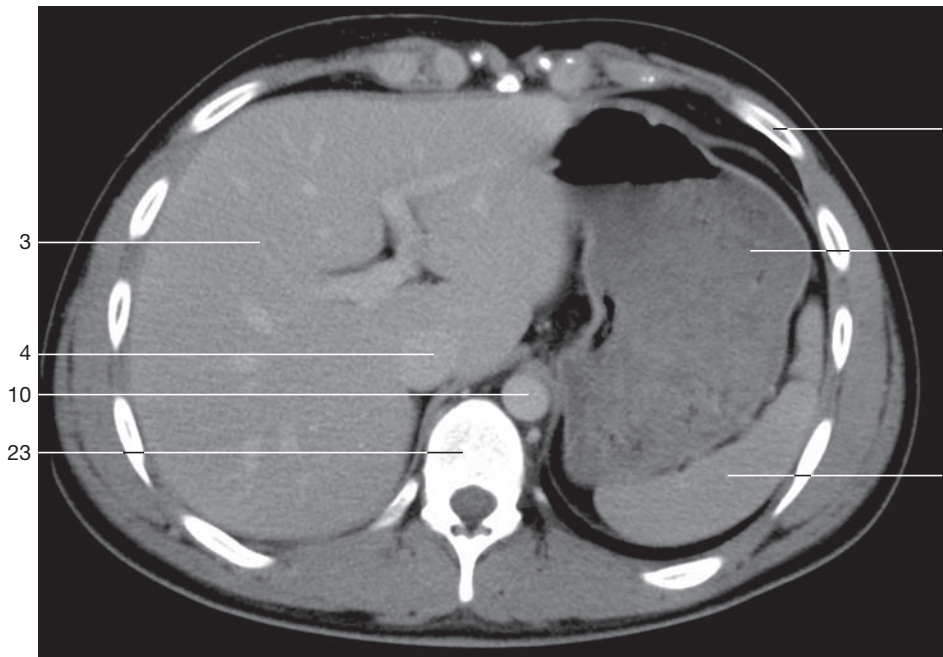
- 1 Rectus abdominis muscle
- 2 Falciform ligament
- 3 Liver (right lobe)
- 4 Inferior vena cava
- 5 Diaphragm
- 6 Intervertebral disc
- 7 Liver (left lobe)
- 8 Rib
- 9 Liver (caudate lobe)
- 10 Abdominal (descending) aorta
- 11 Stomach
- 12 Spleen
- 13 Spinal cord
- 14 Longissimus thoracis and iliocostalis muscles
- 15 Rectus abdominis muscle
- 16 External abdominal oblique muscle
- 17 Transverse colon
- 18 Head of pancreas
- 19 Major duodenal papilla
- 20 Duodenum
- 21 Suprarenal gland and ureter
- 22 Kidney
- 23 Body of vertebra
- 24 Round ligament of liver
- 25 Small intestine
- 26 Superior mesenteric artery and vein
- 27 Psoas major muscle
- 28 Descending colon
- 29 Quadratus lumborum muscle
- 30 Cauda equina



Horizontal section through the abdominal cavity at the level of major duodenal papilla. Section 2 (from below).



Horizontal section through the abdominal cavity. Section 3 (from below).

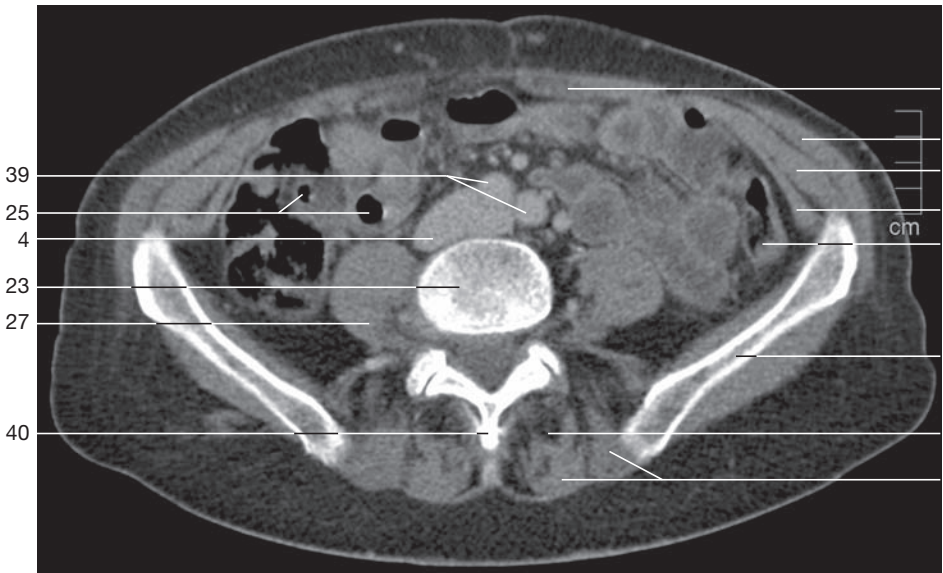


- 31 Ileocecal valve
- 32 Cecum
- 33 Common iliac artery and vein
- 34 Gluteus medius muscle
- 35 Vertebral canal and dura mater
- 36 Iliacus muscle
- 37 Ilium
- 38 Right renal vein
- 39 Common iliac arteries
- 40 Spinous process
- 41 Internal abdominal oblique muscle
- 42 Transverse abdominal muscle
- 43 Longissimus muscle

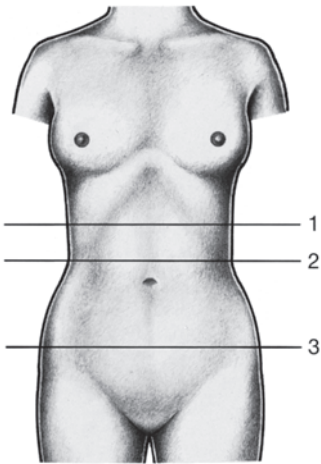
Horizontal section through the abdominal cavity at the level of section 1 (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



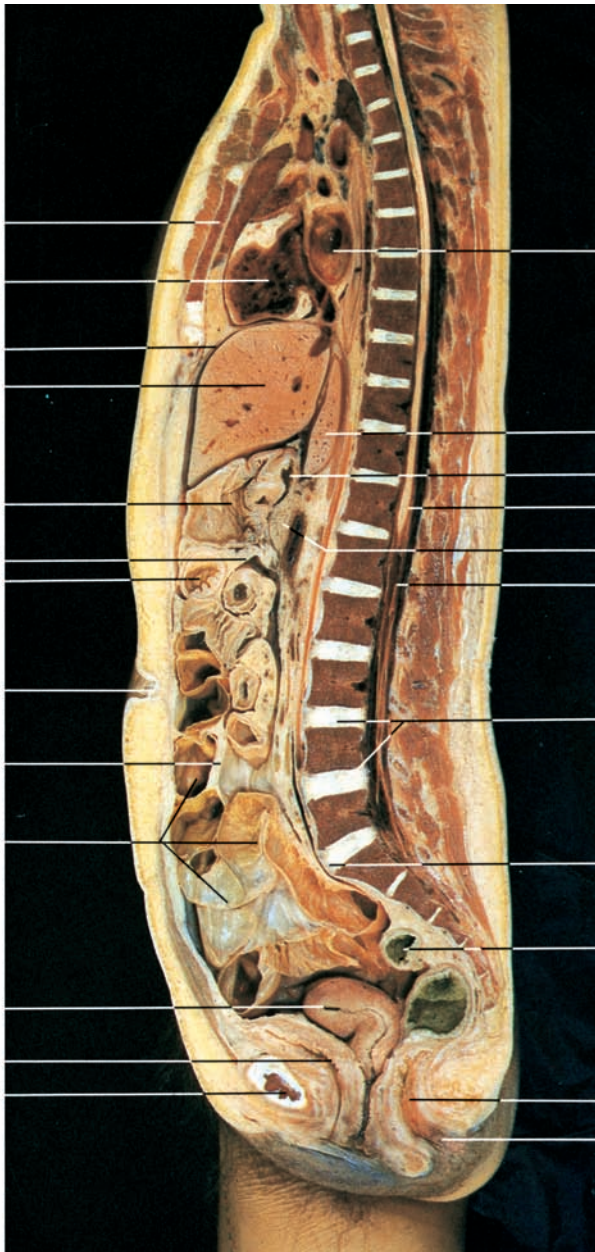
Horizontal section through the abdominal cavity at the level of section 2 (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



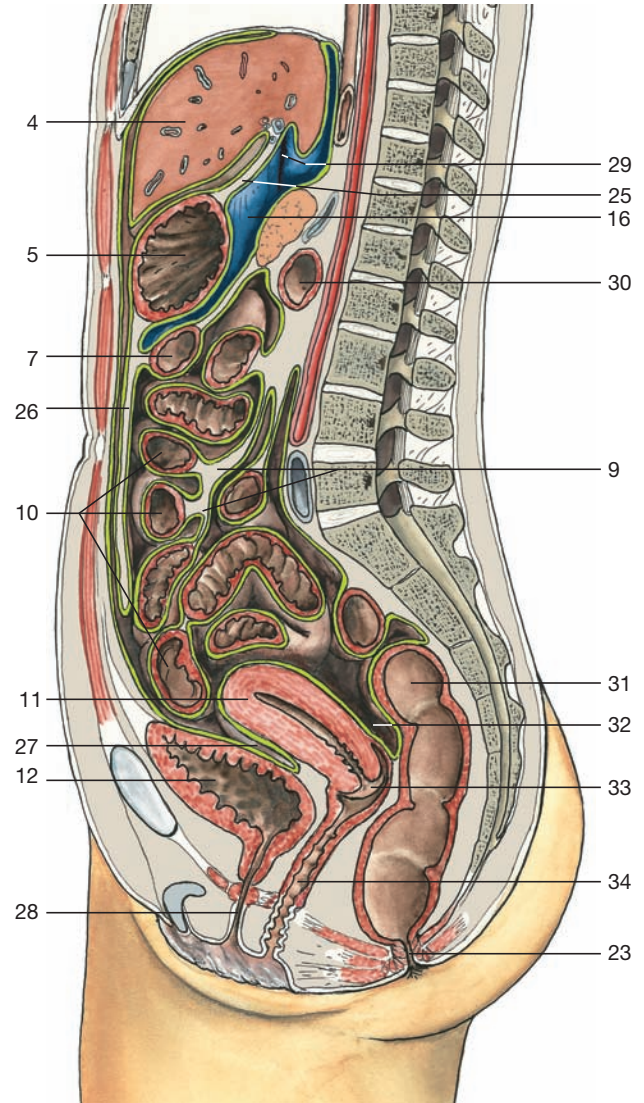
Horizontal section through the abdominal cavity. Levels of the sections are indicated.



Horizontal section through the abdominal cavity at the level of section 3 (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



Midsagittal section through the female trunk.



Midsagittal section through the female trunk.

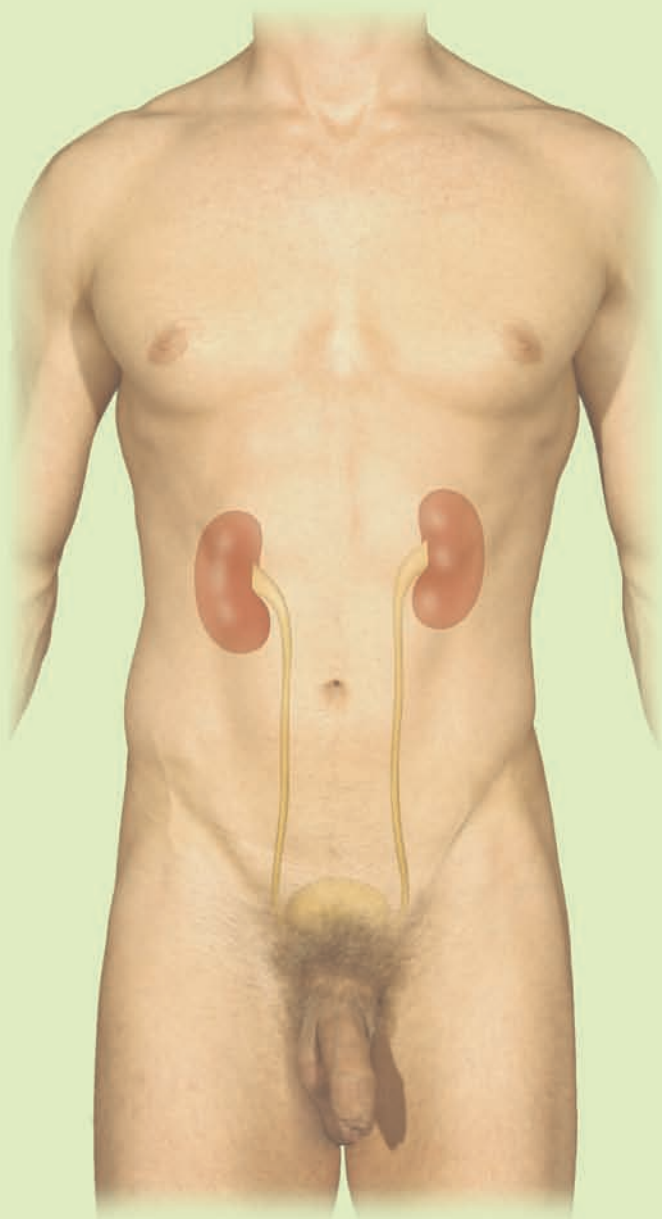
Blue = lesser sac (omental bursa); green = peritoneum.

- | | | |
|----------------------------|---|-------------------------------------|
| 1 Sternum | 13 Pubic symphysis | 24 Anus |
| 2 Right ventricle of heart | 14 Left atrium of heart | 25 Lesser omentum |
| 3 Diaphragm | 15 Caudate lobe of liver | 26 Greater omentum |
| 4 Liver | 16 Lesser sac (omental bursa) | 27 Vesico-uterine pouch |
| 5 Stomach | 17 Conus medullaris | 28 Urethra |
| 6 Transverse mesocolon | 18 Pancreas | 29 Epiploic (omental) foramen |
| 7 Transverse colon | 19 Cauda equina | 30 Duodenum |
| 8 Umbilicus | 20 Intervertebral discs (lumbar vertebral column) | 31 Rectum |
| 9 Mesentery | 21 Sacral promontory | 32 Recto-uterine pouch |
| 10 Small intestine | 22 Sigmoid colon | 33 Vaginal part of cervix of uterus |
| 11 Uterus | 23 Anal canal | 34 Vagina |
| 12 Urinary bladder | | |

6 Retroperitoneal Organs



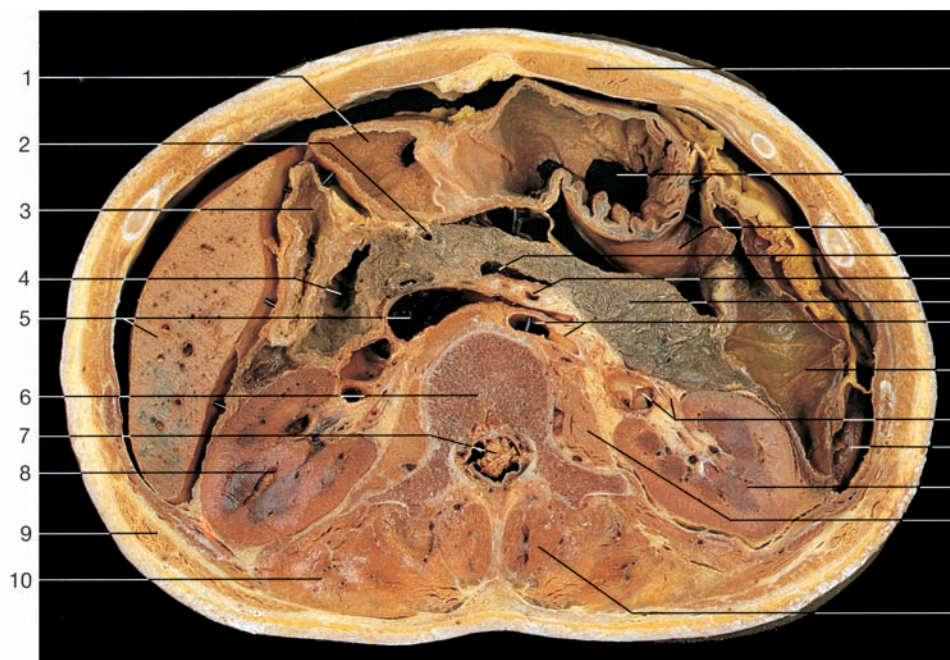
Position of the Urinary Organs _____	334	Urogenital and Anal Regions in the Male _____	362
Kidney _____	336	Female Urogenital System _____	366
Retroperitoneal Region _____	340	Female Genital Organs (isolated) _____	368
Male Urogenital System _____	348	Female Internal Genital Organs _____	370
Male Genital Organs (isolated) _____	350	Female External Genital Organs _____	373
Male External Genital Organs _____	352	Inguinal Region and Female External Genital Organs _____	374
Male Internal Genital Organs _____	355	Urogenital and Anal Regions in the Female _____	375
Pelvic Cavity in the Male _____	357	Pelvic Cavity in the Female _____	378





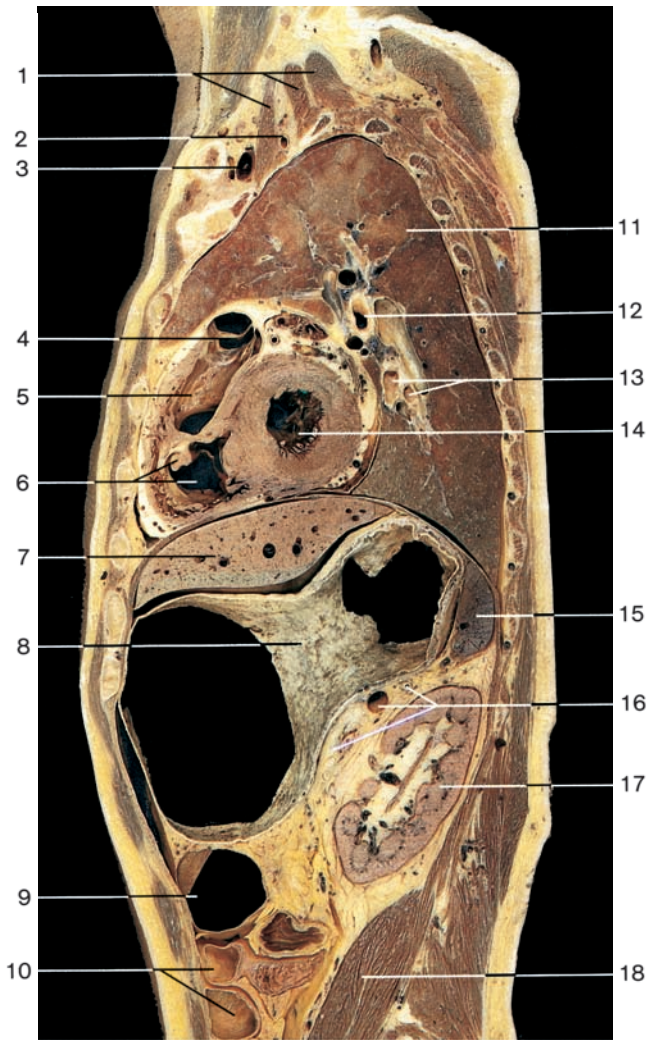
- 1 Kidney
- 2 Ureter
- 3 Inferior vena cava
- 4 Abdominal aorta
- 5 Ovary
- 6 Uterine tube
- 7 Uterus
- 8 Round ligament of uterus and inguinal canal
- 9 Urinary bladder

Retroperitoneal organs of the female in situ
(anterior aspect). View of the female pelvis showing uterus with uterine ligaments, ovary, and urinary bladder.

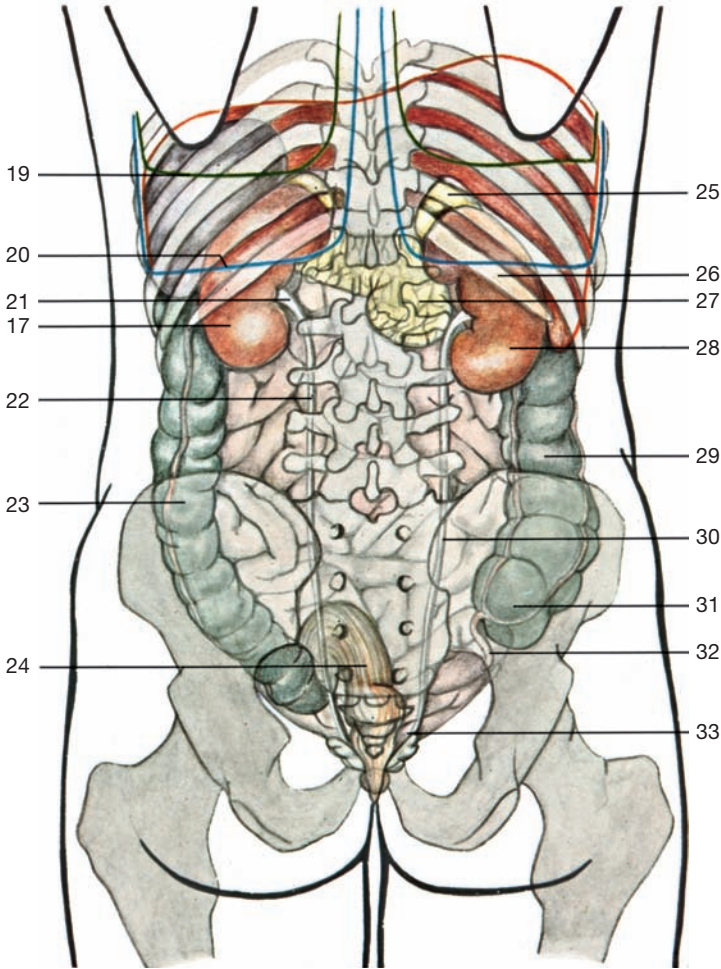


- 1 Pyloric antrum
- 2 Gastroduodenal artery
- 3 Descending part of duodenum
- 4 Vestibule of lesser sac
- 5 Inferior vena cava and liver
- 6 Body of first lumbar vertebra
- 7 Cauda equina
- 8 Right kidney
- 9 Latissimus dorsi muscle
- 10 Iliocostalis muscle
- 11 Rectus abdominis muscle
- 12 Stomach
- 13 Lesser sac
- 14 Splenic vein
- 15 Superior mesenteric artery
- 16 Pancreas
- 17 Aorta and left renal artery
- 18 Transverse colon
- 19 Renal artery and vein
- 20 Spleen
- 21 Left kidney
- 22 Psoas major muscle
- 23 Multifidus muscle

Horizontal section through the abdominal cavity at the level of the first lumbar vertebra
(from below).

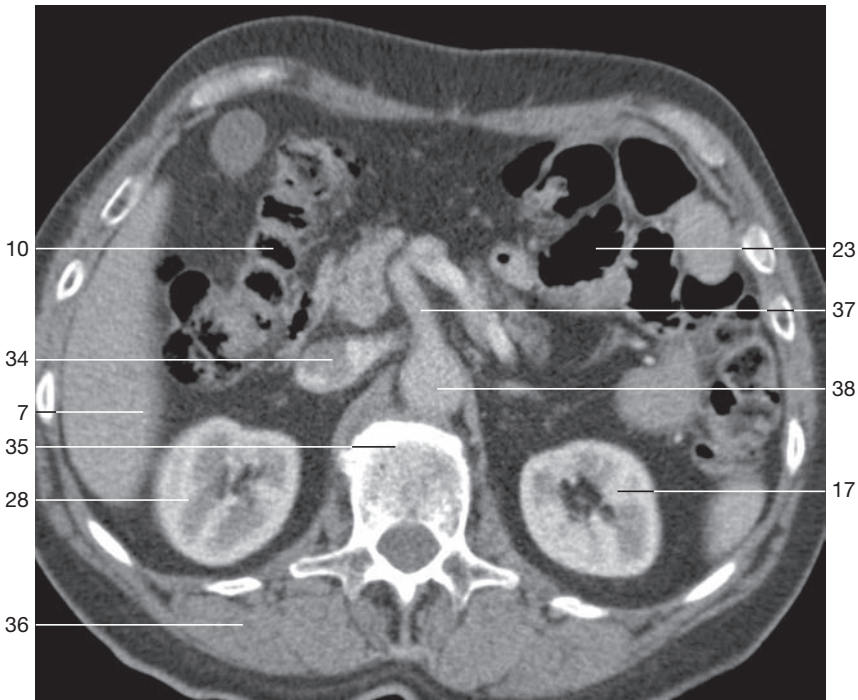


Parasagittal section through thoracic and abdominal cavities at the level of the left kidney 5.5 cm left to median plane.

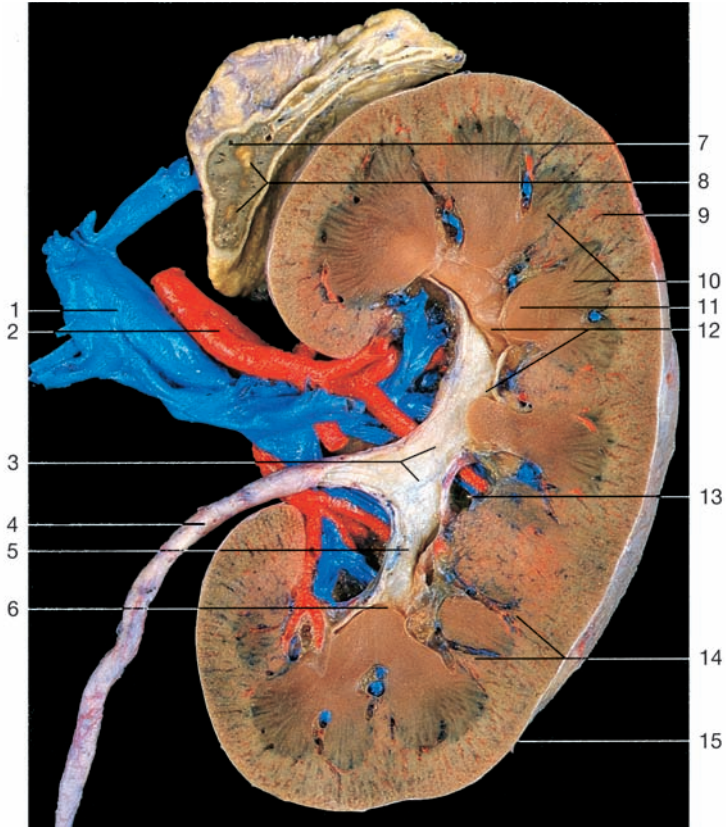


Positions of urinary organs (posterior aspect). Notice that the upper part of the kidney reaches the level of the margin of pleura and lung.

- | | |
|---|--|
| 1 Anterior, middle, and posterior scalene muscles | 19 Margin of lung |
| 2 Left subclavian artery | 20 Margin of pleura |
| 3 Left subclavian vein | 21 Renal pelvis |
| 4 Pulmonic valve | 22 Left ureter |
| 5 Arterial cone | 23 Descending colon |
| 6 Right ventricle of heart | 24 Rectum |
| 7 Liver | 25 Suprarenal gland |
| 8 Stomach | 26 Twelfth rib |
| 9 Transverse colon | 27 Pancreas |
| 10 Small intestine | 28 Right kidney |
| 11 Left lung | 29 Ascending colon |
| 12 Left main bronchus | 30 Right ureter |
| 13 Branches of pulmonary vein | 31 Cecum |
| 14 Left ventricle of heart | 32 Vermiform appendix |
| 15 Spleen | 33 Urinary bladder |
| 16 Splenic artery and vein, and pancreas | 34 Inferior vena cava |
| 17 Left kidney | 35 Body of lumbar vertebra (L ₁) |
| 18 Psoas major muscle | 36 Iliocostal muscle |
| | 37 Superior mesenteric artery |
| | 38 Abdominal aorta |

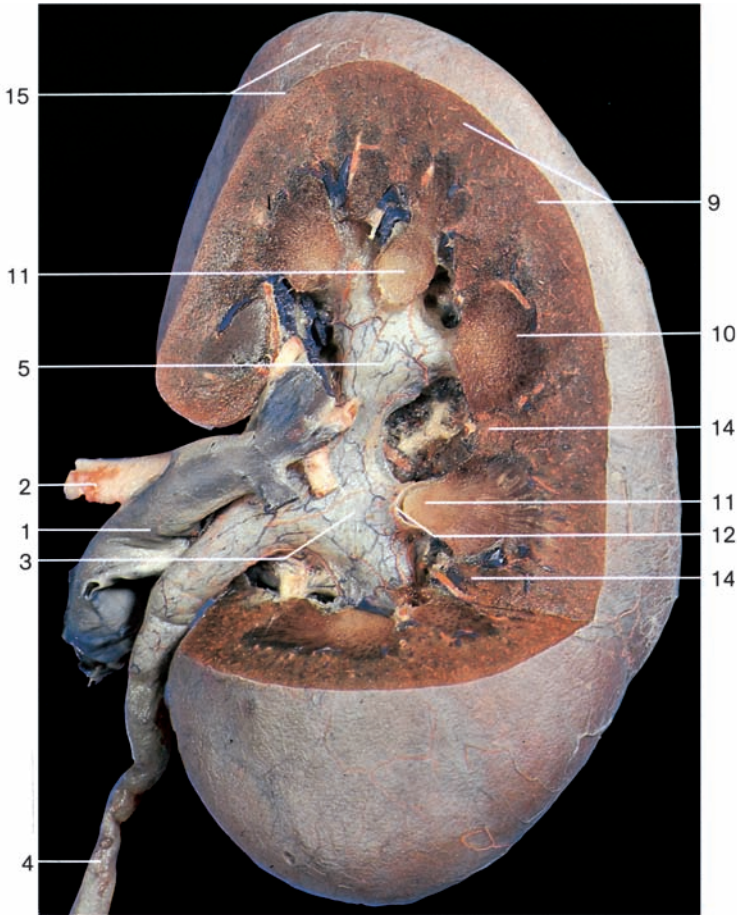


Horizontal section through the abdominal cavity (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



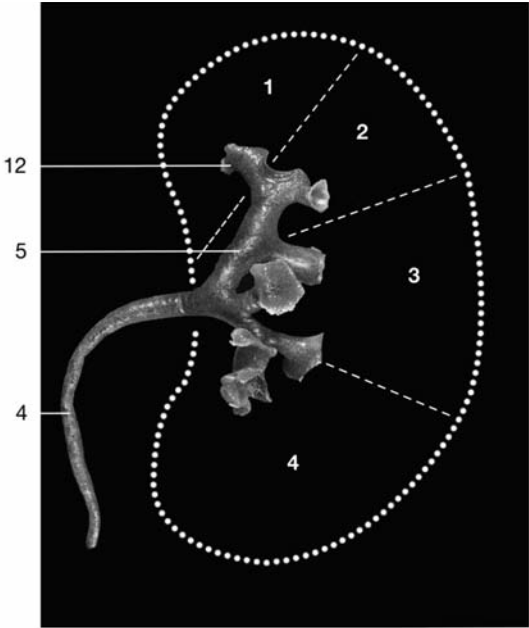
- 1 Renal vein
- 2 Renal artery
- 3 Renal pelvis
- 4 Abdominal part of ureter
- 5 Major renal calyx
- 6 Cribriform area of renal papilla
- 7 Cortex of suprarenal gland
- 8 Medulla of suprarenal gland
- 9 Cortex of kidney
- 10 Medulla of kidney
- 11 Renal papilla
- 12 Minor renal calyx
- 13 Renal sinus
- 14 Renal columns
- 15 Fibrous capsule of kidney

Coronal section through right kidney and suprarenal gland (posterior aspect). The renal pelvis has been opened and the fatty tissue removed to display the renal vessels.



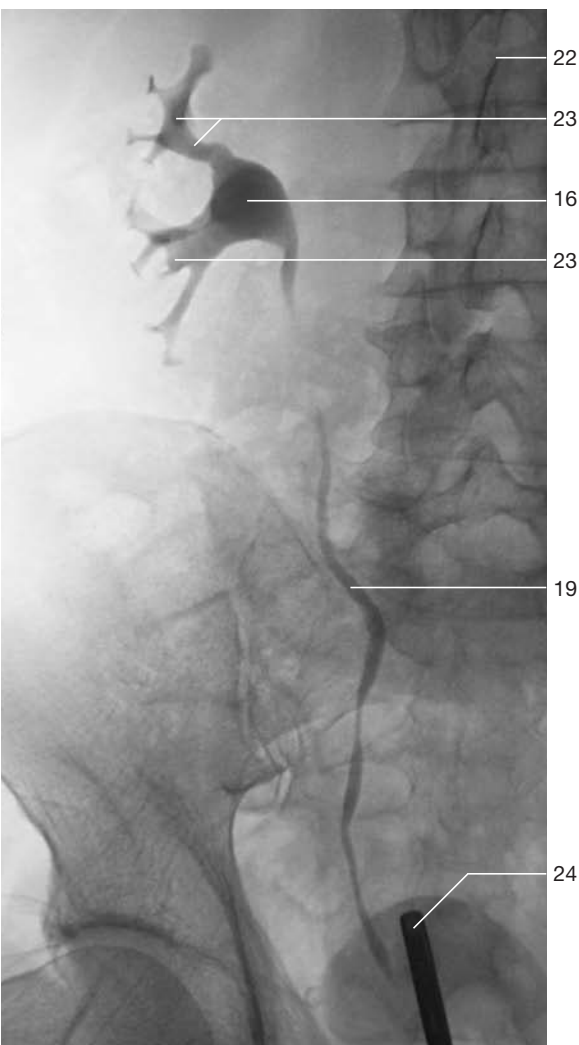
Right kidney (posterior aspect). Partial coronal section to expose internal aspect of the kidney.

Each kidney can be divided into five segments supplied by individual interlobar arteries known as end arteries. Thus, obstruction leads to infarcts marking the trace of segment borders. The anterior kidney surface reveals four segments; the posterior, only three (1, 4, and 5).

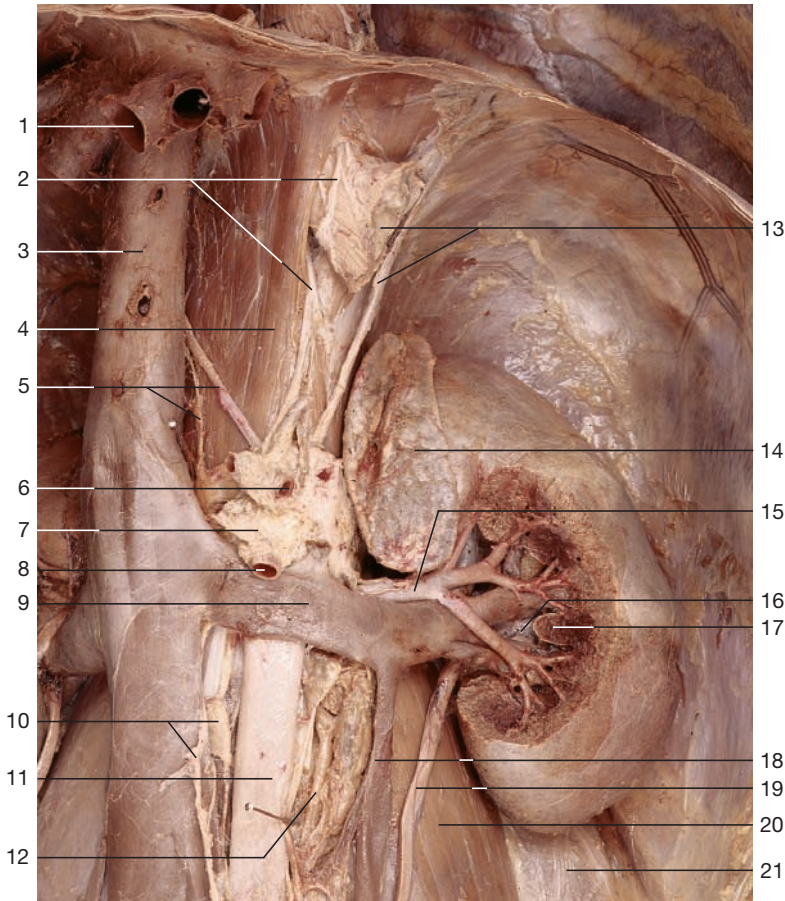


Cast of renal pelvis and calices.
1–4 = Renal segments on anterior surface.

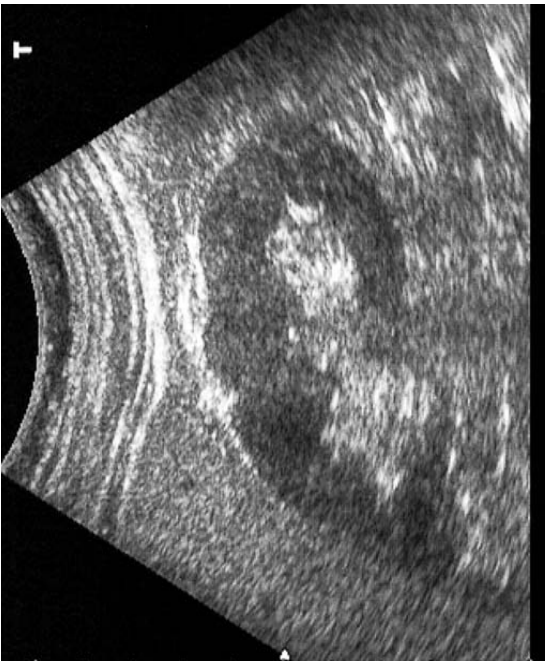
- 1 Hepatic vein
- 2 Anterior and posterior vagal trunk
- 3 Inferior vena cava
- 4 Lumbar part of diaphragm
- 5 Right greater and lesser splanchnic nerves
- 6 Celiac trunk
- 7 Celiac ganglion and plexus
- 8 Superior mesenteric artery
- 9 Left renal vein
- 10 Right sympathetic trunk and ganglion
- 11 Abdominal aorta
- 12 Left sympathetic trunk
- 13 Esophagus (cut) and left greater splanchnic nerve
- 14 Left suprarenal gland
- 15 Left renal artery
- 16 Renal pelvis
- 17 Renal papilla with minor calyx
- 18 Left testicular vein
- 19 Ureter
- 20 Psoas major muscle
- 21 Quadratus lumborum muscle
- 22 Lumbar vertebra (L₂)
- 23 Renal calyx
- 24 Catheter



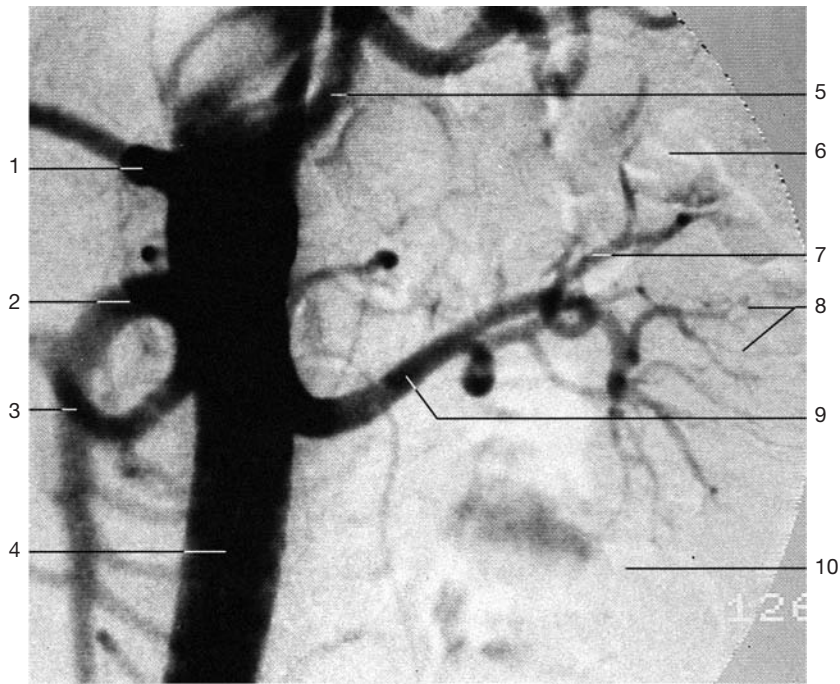
Renal pelvis with calices and ureter (X-ray, retrograde injection). (Courtesy of Prof. Herrlinger, Fürth, Germany.)



Left kidney and suprarenal gland in situ. The anterior cortical layer of the kidney has been removed to display the renal pelvis and papillae.

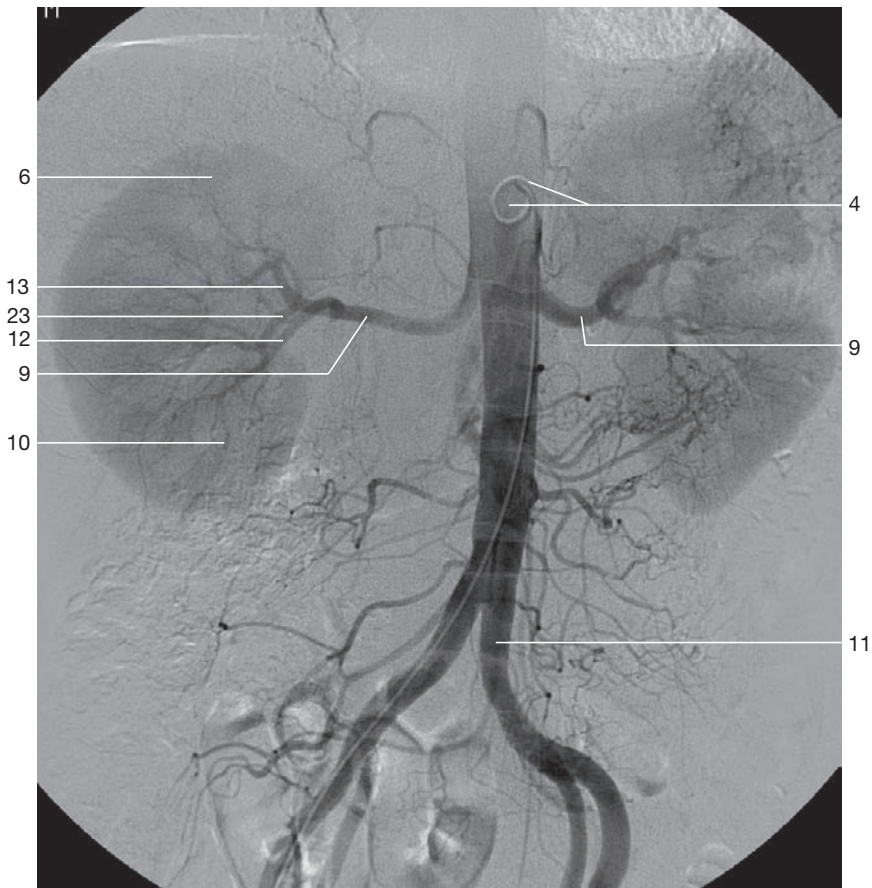


Right kidney (ultrasound image). (Courtesy of Prof. Herrlinger, Fürth, Germany.)

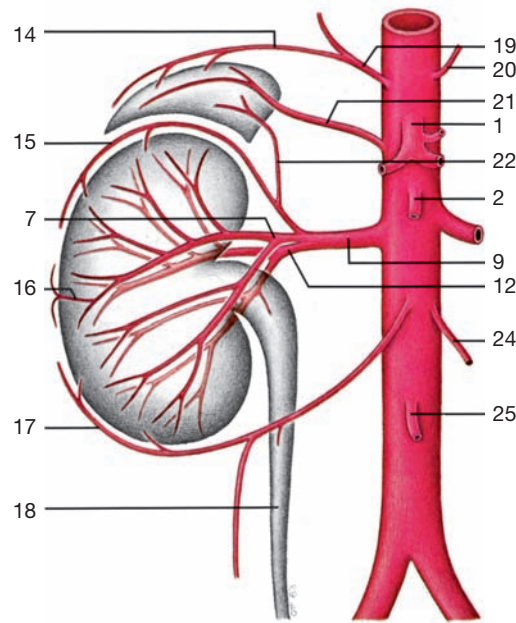


Subtraction angiography of the abdominal aorta with renal artery and renal vessels.

- 1 Celiac trunk
- 2 Superior mesenteric artery
- 3 Middle colic artery
- 4 Abdominal aorta (with catheter in the figure below)
- 5 Splenic artery
- 6 Upper pole of kidney
- 7 Anterior branch of renal artery
- 8 Interlobular arteries
- 9 Renal artery
- 10 Lower pole of kidney
- 11 Common iliac artery
- 12 Posterior branch of renal artery
- 13 Anterior superior segmental artery of renal artery
- 14 Superior suprarenal artery
- 15 Upper capsular artery
- 16 Perforating artery
- 17 Lower capsular artery
- 18 Ureter
- 19 Right inferior phrenic artery
- 20 Left inferior phrenic artery
- 21 Middle suprarenal artery
- 22 Inferior suprarenal artery
- 23 Anterior segmental artery of renal artery
- 24 Left testicular (or ovarian) artery
- 25 Inferior mesenteric artery



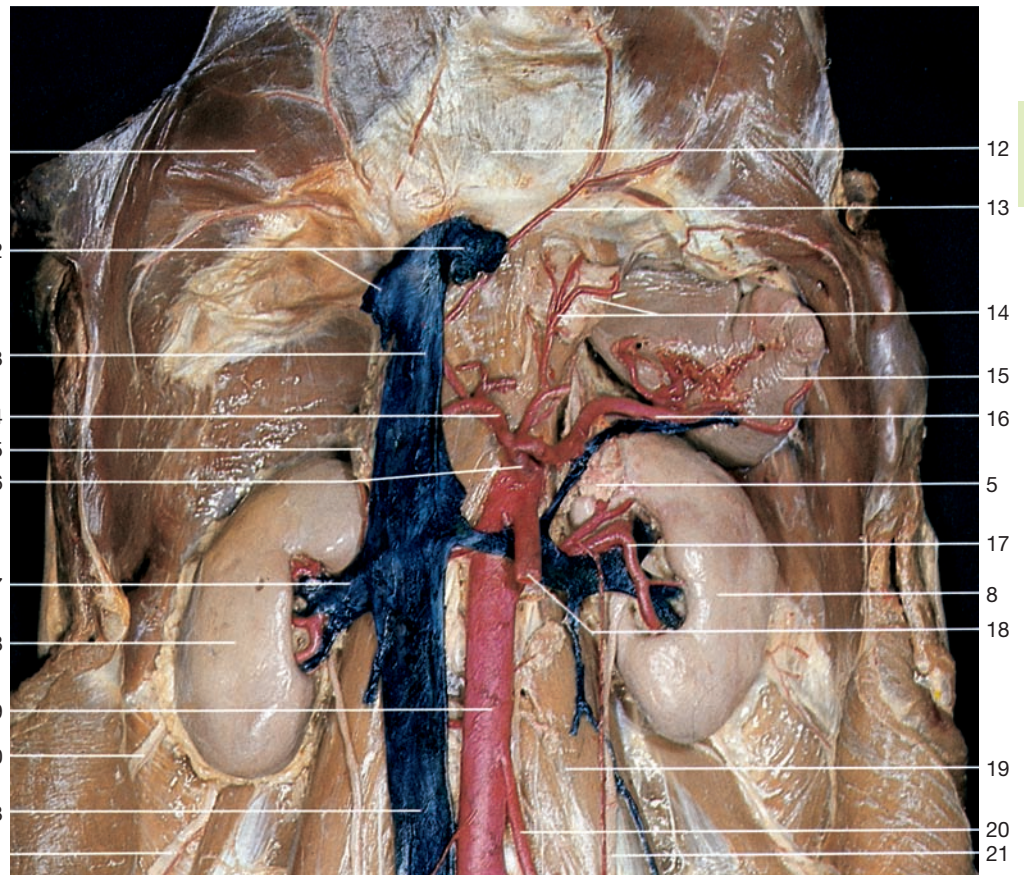
Arteriography of the abdominal aorta with renal arteries and renal vessels.
(Courtesy of Dr. Wieners, Dept. of Radiology, Berlin, Germany.)



Arteries of kidney and suprarenal gland.

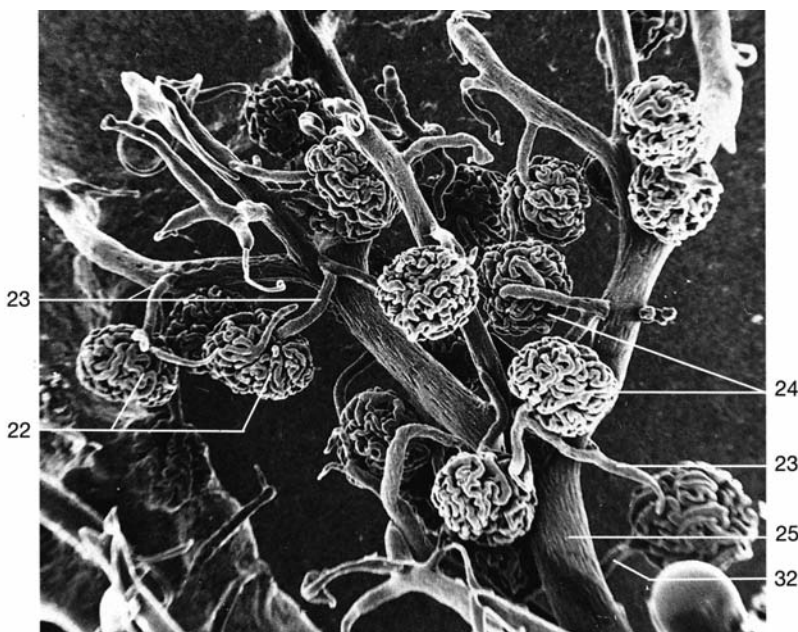


- 1 Diaphragm
- 2 Hepatic veins
- 3 Inferior vena cava
- 4 Common hepatic artery
- 5 Suprarenal gland
- 6 Celiac trunk
- 7 Right renal vein
- 8 Kidney
- 9 Abdominal aorta
- 10 Subcostal nerve
- 11 Iliohypogastric nerve
- 12 Central tendon of diaphragm
- 13 Inferior phrenic artery
- 14 Cardiac part of stomach
- 15 Spleen
- 16 Splenic artery
- 17 Superior renal artery
- 18 Superior mesenteric artery
- 19 Psoas major muscle
- 20 Inferior mesenteric artery
- 21 Ureter
- 22 Glomerulus
- 23 Afferent arteriole of glomerulus
- 24 Glomeruli
- 25 Radiating cortical artery
- 26 Subcortical or arcuate artery
- 27 Subcortical or arcuate vein
- 28 Interlobular vein
- 29 Interlobular artery
- 30 Interlobar artery and vein
- 31 Vessels of renal capsule
- 32 Efferent arteriole of glomerulus
- 33 Vasa recta of renal medulla
- 34 Spiral arteries of renal pelvis

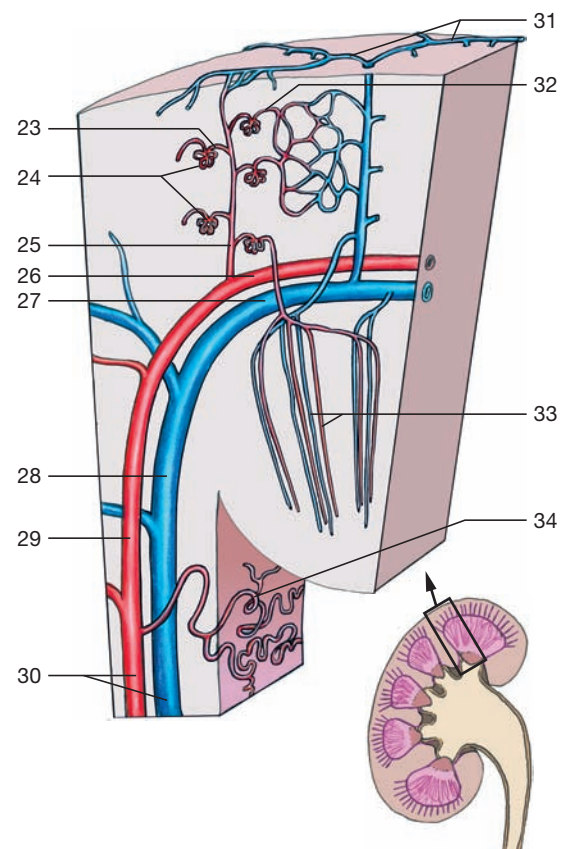


Retroperitoneal organs, kidneys, and suprarenal glands in situ (anterior aspect).

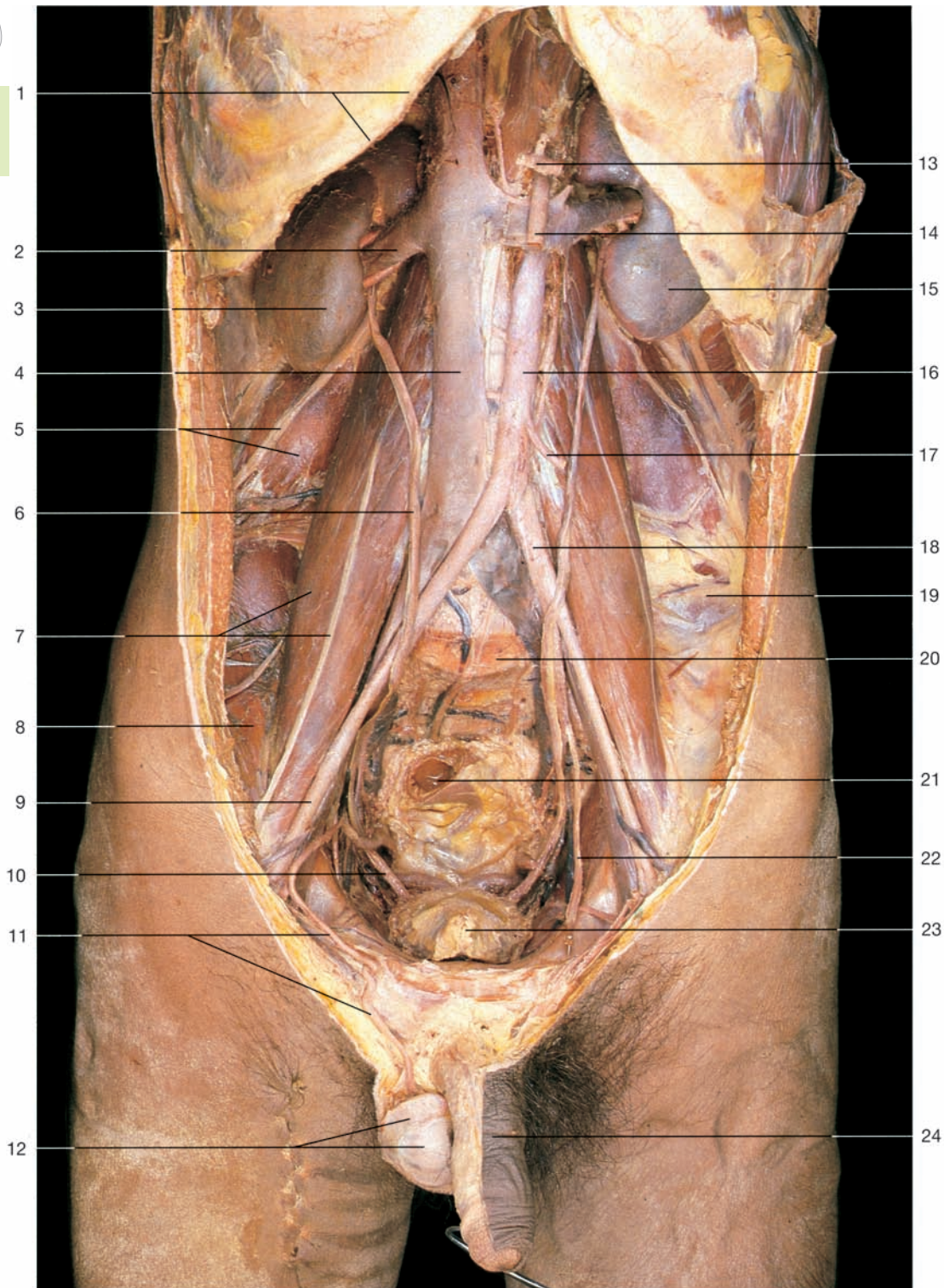
Red = arteries; blue = veins.



Scanning electron micrograph showing glomeruli and associated arteries (magn. 210×).

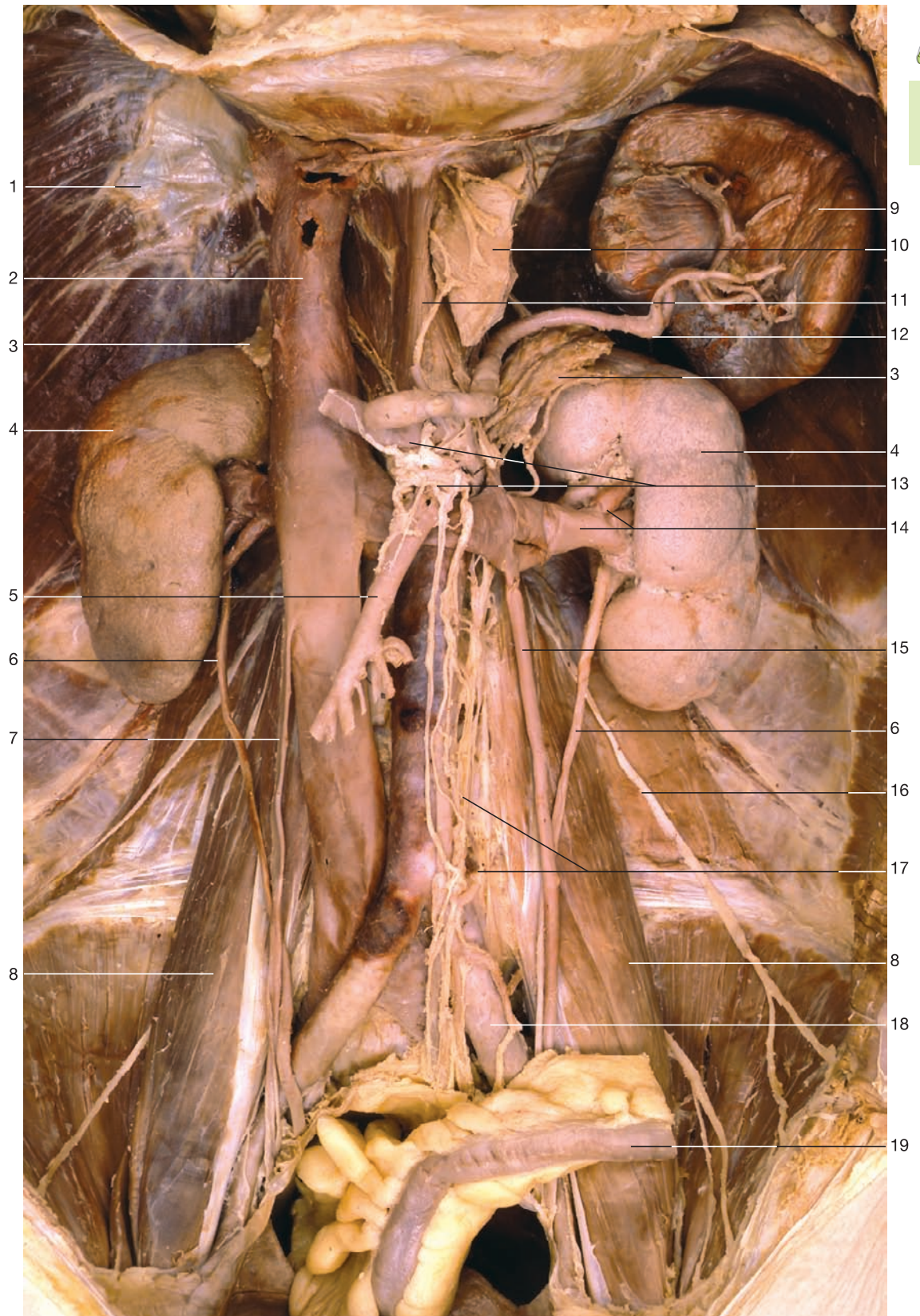


Architecture of the vascular system of the kidney.



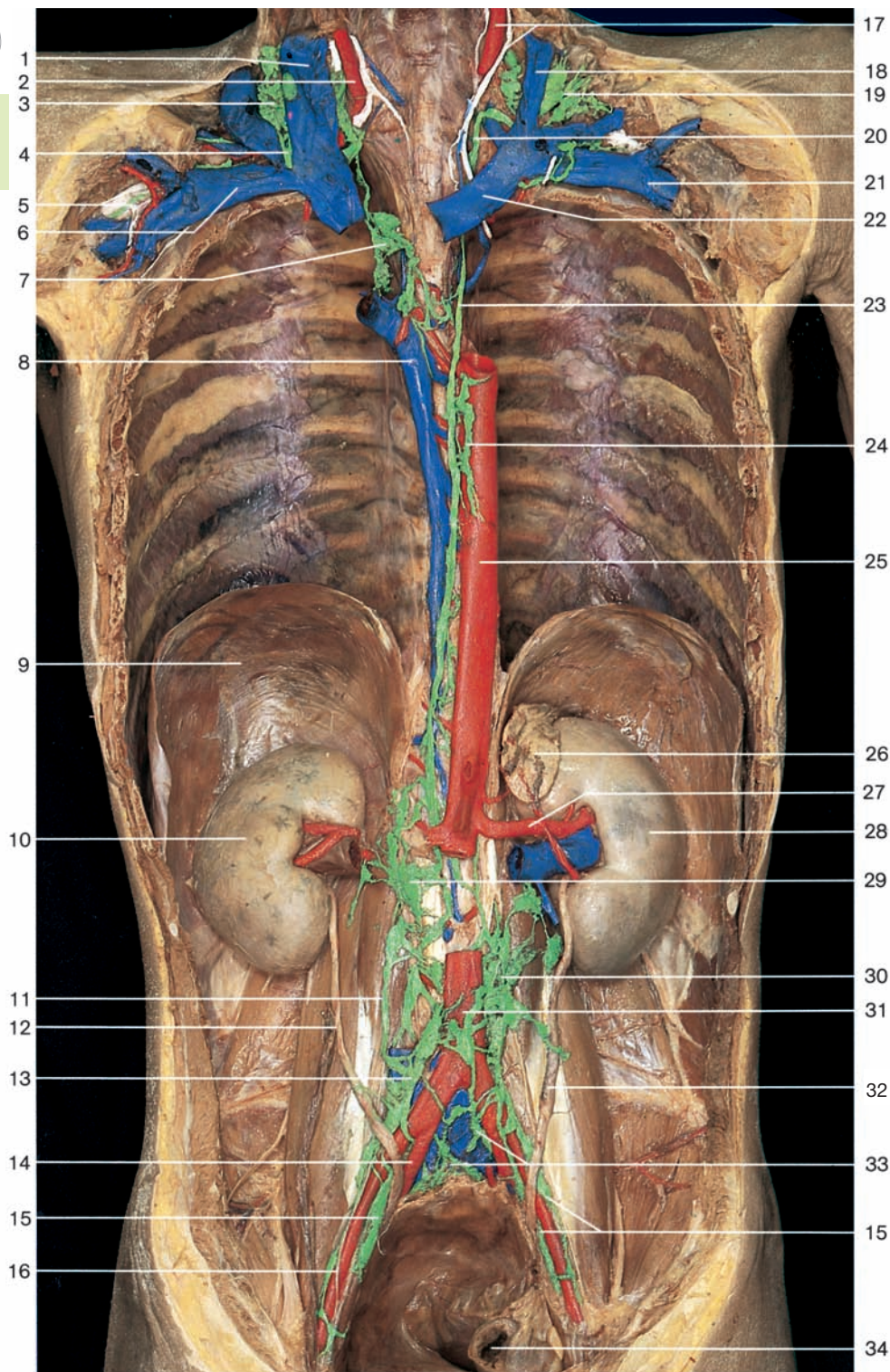
Retroperitoneal organs, urinary system in the male (anterior aspect). The peritoneum has been removed.

- | | | |
|---|-------------------------------|-------------------------------|
| 1 Costal arch | 8 Iliacus muscle | 17 Inferior mesenteric artery |
| 2 Right renal vein | 9 External iliac artery | 18 Common iliac artery |
| 3 Right kidney | 10 Ureter (pelvic part) | 19 Iliac crest |
| 4 Inferior vena cava | 11 Ductus deferens | 20 Sacral promontory |
| 5 Iliohypogastric nerve and quadratus lumborum muscle | 12 Testis and epididymis | 21 Rectum (cut) |
| 6 Ureter (abdominal part) | 13 Celiac trunk | 22 Medial umbilical ligament |
| 7 Psoas major muscle and genitofemoral nerve | 14 Superior mesenteric artery | 23 Urinary bladder |
| | 15 Left kidney | 24 Penis |
| | 16 Abdominal aorta | |



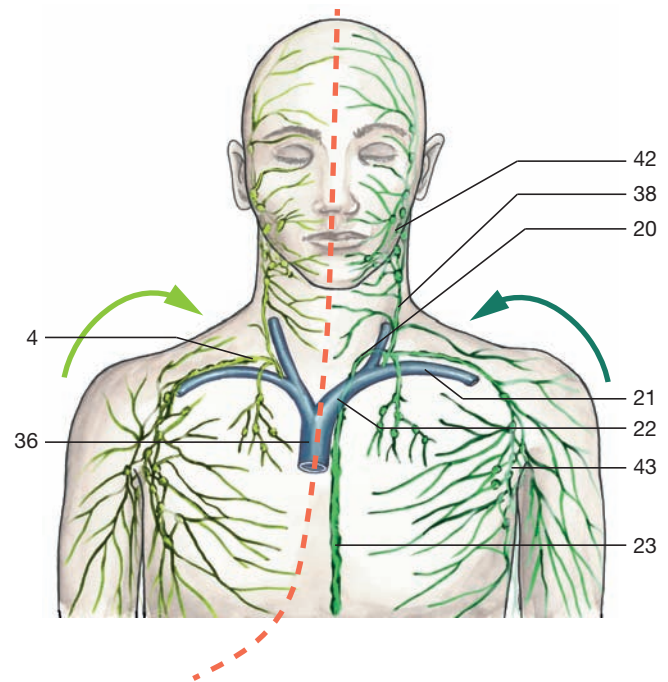
Retroperitoneal organs, urinary system in the male (anterior aspect). The peritoneum has been removed. Note the autonomic plexus and ganglia at the abdominal aorta.

- | | | | |
|------------------------------|----------------------------|-------------------------------------|---|
| 1 Diaphragm | 7 Right spermatic vein | 12 Splenic artery | 17 Superior hypogastric plexus and ganglion |
| 2 Inferior vena cava | 8 Psoas major muscle | 13 Celiac trunk and celiac ganglion | 18 Left common iliac artery |
| 3 Suprarenal gland | 9 Spleen | 14 Renal artery and vein | 19 Sigmoid colon |
| 4 Kidney | 10 Cardiac part of stomach | 15 Left spermatic vein | |
| 5 Superior mesenteric artery | 11 Abdominal aorta | 16 Ilio-inguinal nerve | |
| 6 Ureter | | | |

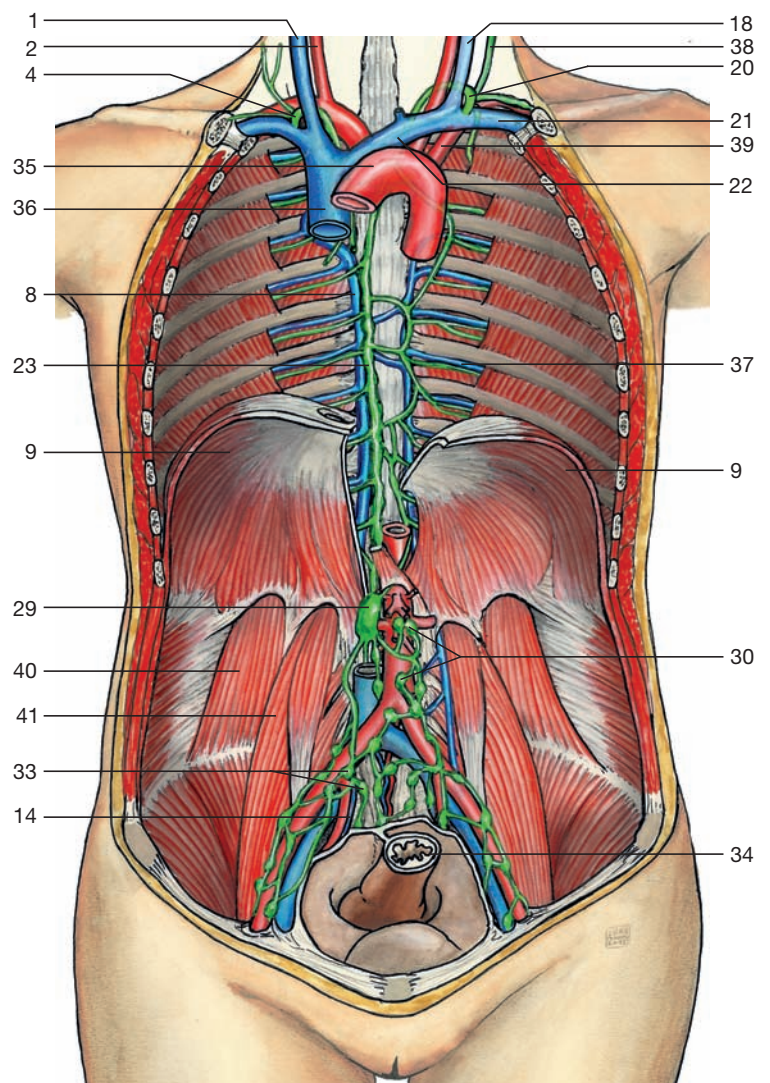


Lymph vessels and lymph nodes of the posterior wall of thoracic and abdominal cavities (anterior aspect). Green = lymph vessels and nodes; blue = veins; red = arteries; white = nerves.

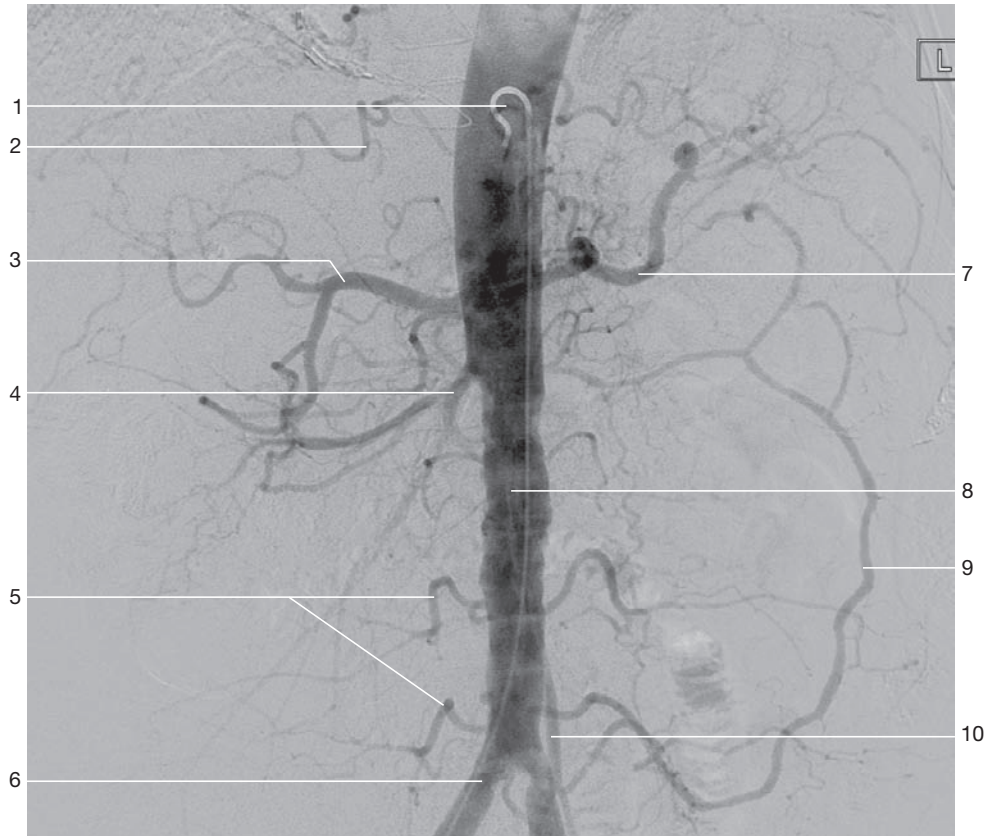
- | | | |
|---|--|--|
| 1 Internal jugular vein | 10 Right kidney | 19 Deep cervical lymph nodes |
| 2 Right common carotid artery and right vagus nerve | 11 Right lumbar trunk | 20 Thoracic duct entering left jugular angle |
| 3 Jugulo-omohyoid lymph node | 12 Right ureter | 21 Left subclavian vein |
| 4 Right lymphatic duct | 13 Common iliac lymph nodes | 22 Left brachiocephalic vein |
| 5 Subclavian trunk | 14 Right internal iliac artery | 23 Thoracic duct |
| 6 Right subclavian vein | 15 External iliac lymph nodes | 24 Mediastinal lymph nodes |
| 7 Bronchomediastinal trunk | 16 Right external iliac artery | 25 Thoracic aorta |
| 8 Azygos vein | 17 Left common carotid artery and left vagus nerve | 26 Left suprarenal gland |
| 9 Diaphragm | 18 Internal jugular vein | 27 Left renal artery |
| | | 28 Left kidney |
| | | 29 Cisterna chyli |
| | | 30 Lumbar lymph nodes |
| | | 31 Abdominal aorta |
| | | 32 Left ureter |
| | | 33 Sacral lymph nodes |
| | | 34 Rectum (cut edge) |
| | | 35 Aortic arch |
| | | 36 Superior vena cava |
| | | 37 Intercostal vein |
| | | 38 Left jugular trunk |
| | | 39 Left subclavian artery |
| | | 40 Quadratus lumborum muscle |
| | | 41 Psoas major muscle |
| | | 42 Parotid lymph nodes |
| | | 43 Axillary lymph nodes |



Lymph vessels and lymph nodes of the upper part of the body. Dotted red line = border between irrigation areas of the right and left part of the body.

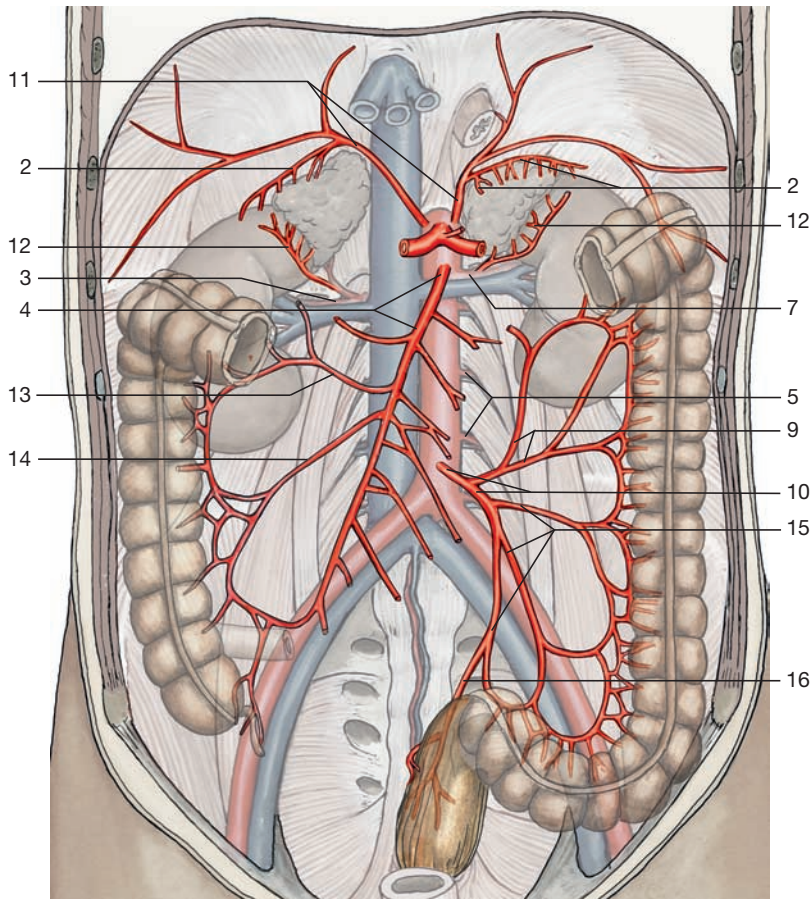


Lymph vessels and lymph nodes of the posterior wall of thoracic and abdominal cavities (anterior aspect). Note the course of the thoracic duct from the cisterna chyli to the left venous angle. The lymph vessels of the intercostal spaces communicate mainly with the thoracic duct.

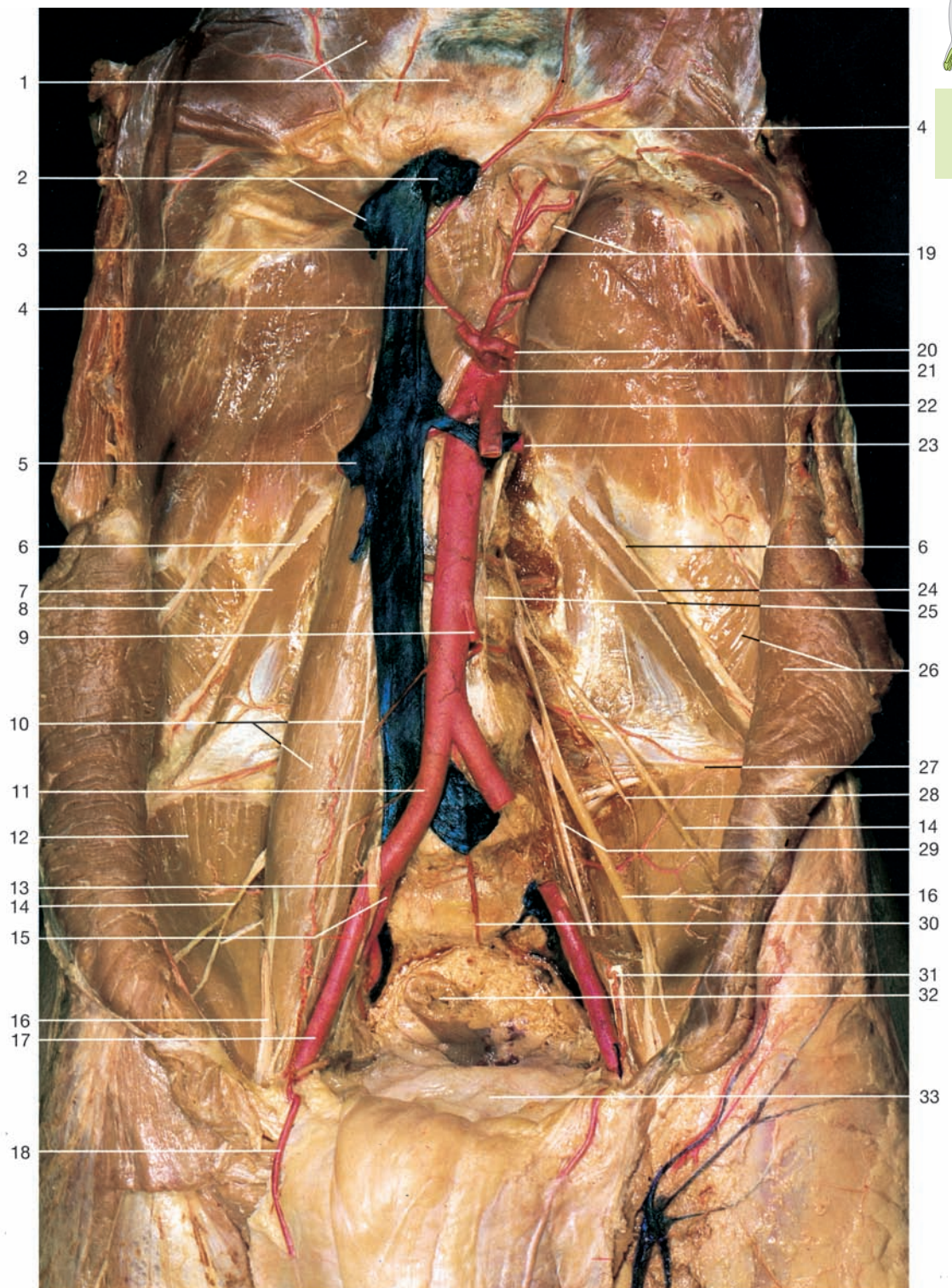


- 1 Abdominal aorta (containing partly the catheter)
- 2 Superior suprarenal artery
- 3 Hepatic artery
- 4 Superior mesenteric artery
- 5 Lumbar arteries
- 6 Common iliac artery (with catheter)
- 7 Splenic artery
- 8 Abdominal aorta (partly sclerotized)
- 9 Left colic artery
- 10 Inferior mesenteric artery
- 11 Inferior phrenic arteries
- 12 Middle suprarenal artery
- 13 Right colic artery
- 14 Ileocolic artery
- 15 Sigmoid arteries
- 16 Superior rectal artery

Arteriography of the abdominal aorta. The distal portion of the aorta reveals sclerotic changes. (Courtesy of Dr. Wieners, Dept. of Radiology, Berlin, Germany.)



Course of the superior and inferior mesenteric arteries within the retroperitoneal space supplying the ascending and descending parts of the colon (anterior aspect).

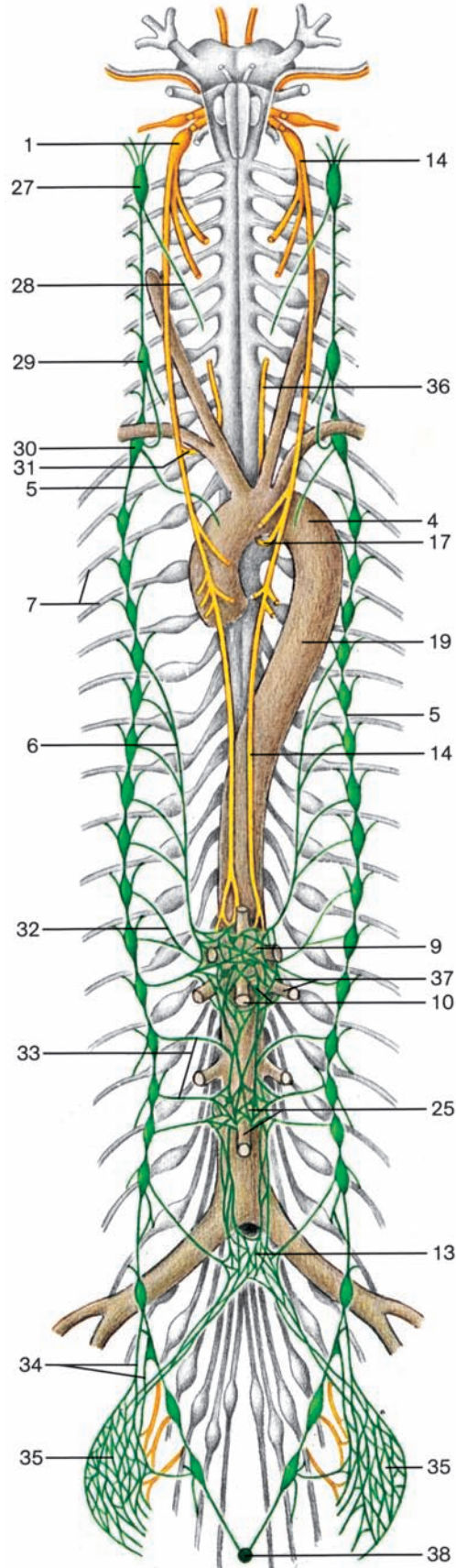


Vessels and nerves within the retroperitoneal space (anterior aspect). Part of the left psoas major muscle has been removed to display the lumbar plexus. Red = arteries; blue = veins.

- | | | | |
|------------------------------|---|---|---|
| 1 Diaphragm | 10 Right genitofemoral nerve and psoas major muscle | 19 Cardiac part of stomach and esophageal branches of left gastric artery | 27 Iliac crest |
| 2 Hepatic veins | 11 Common iliac artery | 20 Splenic artery | 28 Left genitofemoral nerve |
| 3 Inferior vena cava | 12 Iliacus muscle | 21 Celiac trunk | 29 Left obturator nerve |
| 4 Inferior phrenic artery | 13 Right ureter (divided) | 22 Superior mesenteric artery | 30 Median sacral artery |
| 5 Right renal vein | 14 Lateral femoral cutaneous nerve | 23 Left renal artery | 31 Psoas major muscle (divided) with supplying artery |
| 6 Iliohypogastric nerve | 15 Internal iliac artery | 24 Ilio-inguinal nerve | 32 Rectum (cut) |
| 7 Quadratus lumborum muscle | 16 Femoral nerve | 25 Sympathetic trunk | 33 Urinary bladder |
| 8 Subcostal nerve | 17 External iliac artery | 26 Transverse abdominal muscle | |
| 9 Inferior mesenteric artery | 18 Inferior epigastric artery | | |



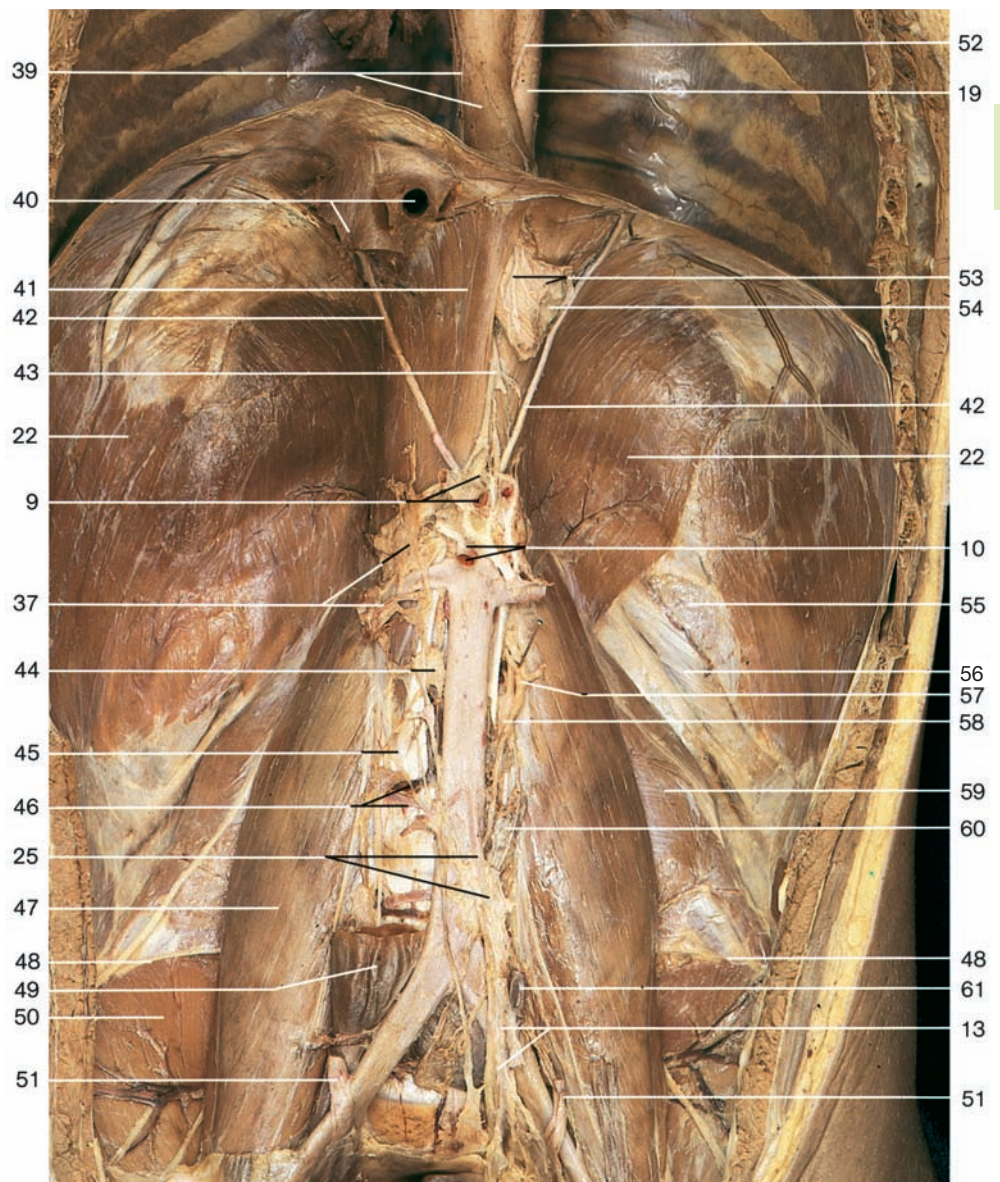
Posterior wall of thoracic and abdominal cavities with sympathetic trunk, vagus nerve, and autonomic ganglia (anterior aspect). Thoracic and abdominal organs removed, except for the esophagus and aorta.



Organization of autonomic nervous system. Yellow = parasympathetic nerves; green = sympathetic nerves.



Ganglia and plexus of the autonomic nervous system within the retroperitoneal space (anterior aspect). The kidneys and the inferior vena cava with its tributaries have been removed.

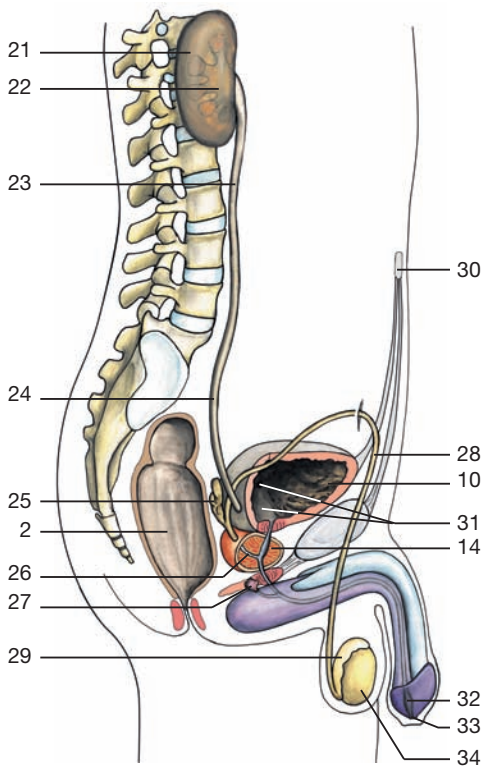


- | | | | |
|---|--|---|--|
| 1 Right vagus nerve | 16 Left subclavian artery | 31 Right recurrent laryngeal nerve | 46 Lumbar artery and vein |
| 2 Right subclavian artery | 17 Left recurrent laryngeal nerve | 32 Lesser splanchnic nerve | 47 Psoas major muscle |
| 3 Esophagus | 18 Inferior cervical cardiac nerve | 33 Lumbar splanchnic nerves | 48 Iliac crest |
| 4 Aortic arch | 19 Thoracic aorta | 34 Sacral splanchnic nerves | 49 Inferior vena cava |
| 5 Sympathetic trunk | 20 Esophageal plexus | 35 Inferior hypogastric ganglion and plexus | 50 Iliacus muscle |
| 6 Greater splanchnic nerve | 21 Azygos vein | 36 Left recurrent laryngeal nerve | 51 Ureter |
| 7 Intercostal nerve | 22 Diaphragm | 37 Aorticorenal plexus and renal artery | 52 Left vagus nerve forming the esophageal plexus |
| 8 Abdominal part of esophagus and vagal trunk | 23 Splenic artery | 38 Ganglion impar | 53 Left vagus nerve forming the gastric plexus |
| 9 Celiac trunk with celiac ganglion | 24 Left renal artery and plexus | 39 Esophagus with branches of vagus nerve | 54 Esophagus continuing into the cardiac part of stomach |
| 10 Superior mesenteric artery and ganglion | 25 Inferior mesenteric ganglion and artery | 40 Hepatic veins | 55 Lumbarocostal triangle |
| 11 Psoas major muscle and genitofemoral nerve | 26 Left external iliac artery | 41 Right crus of diaphragm | 56 Position of twelfth rib |
| 12 Common iliac artery | 27 Superior cervical ganglion of sympathetic trunk | 42 Inferior phrenic artery | 57 Left lumbar lymph trunk |
| 13 Superior hypogastric plexus and ganglion | 28 Superior cardiac branch of sympathetic trunk | 43 Right vagus nerve entering the celiac ganglion | 58 Ganglion of sympathetic trunk |
| 14 Left vagus nerve | 29 Middle cervical ganglion of sympathetic trunk | 44 Right lumbar lymph trunk | 59 Quadratus lumborum muscle |
| 15 Brachial plexus | 30 Inferior cervical ganglion of sympathetic trunk | 45 Lumbar part of right sympathetic trunk | 60 Lumbar part of left sympathetic trunk |
| | | | 61 Iliac lymph vessels |

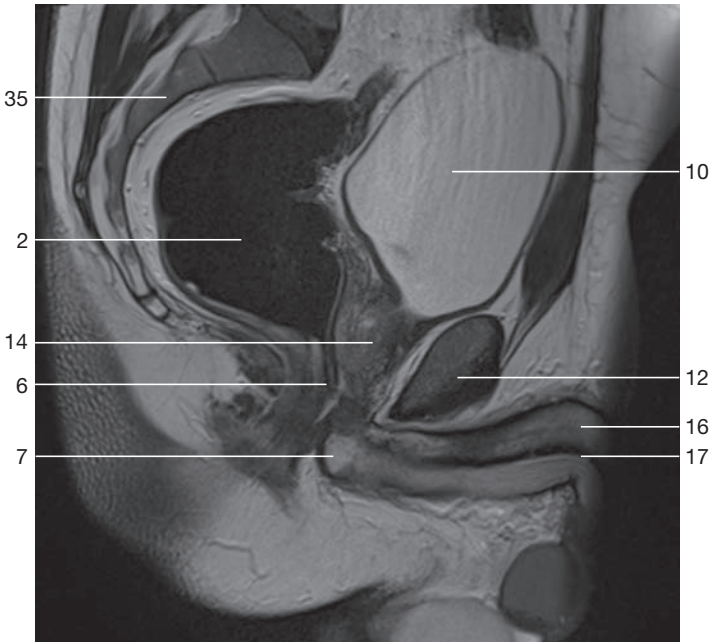


Male urogenital system (midsagittal section through the pelvic cavity).

- 1 Sigmoid colon
- 2 Ampulla of rectum
- 3 Ampulla of ductus deferens
- 4 External anal sphincter muscle
- 5 Internal anal sphincter muscle
- 6 Anal canal
- 7 Bulb of penis
- 8 Testis (cut surface)
- 9 Median umbilical ligament
- 10 Urinary bladder
- 11 Internal urethral orifice and sphincter
- 12 Pubic symphysis
- 13 Prostatic part of urethra
- 14 Prostate gland
- 15 Membranous part of urethra and external urethral sphincter
- 16 Corpus cavernosum of penis
- 17 Spongy urethra
- 18 Corpus spongiosum of penis
- 19 Foreskin or prepuce
- 20 Glans penis
- 21 Kidney
- 22 Renal pelvis
- 23 Abdominal part of ureter
- 24 Pelvic part of ureter
- 25 Seminal vesicle
- 26 Ejaculatory duct
- 27 Bulbo-urethral gland (Cowper's gland)
- 28 Ductus deferens
- 29 Epididymis
- 30 Umbilicus
- 31 Trigone of urinary bladder and ureteric orifice
- 32 Navicular fossa of urethra
- 33 External urethral orifice
- 34 Testis
- 35 Sacrum



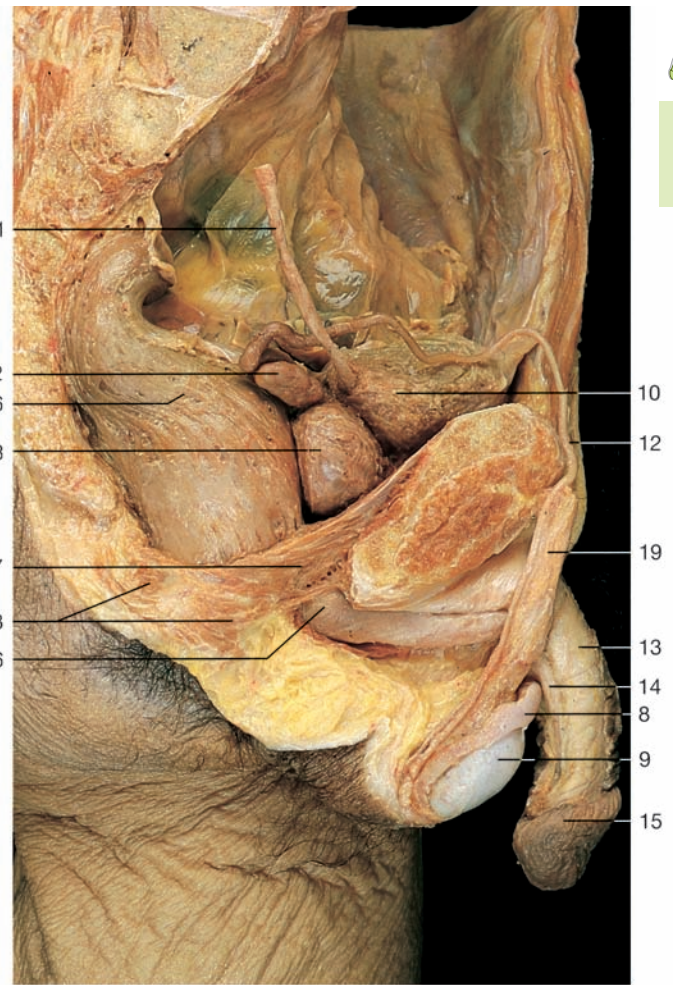
Male urogenital system (lateral aspect).



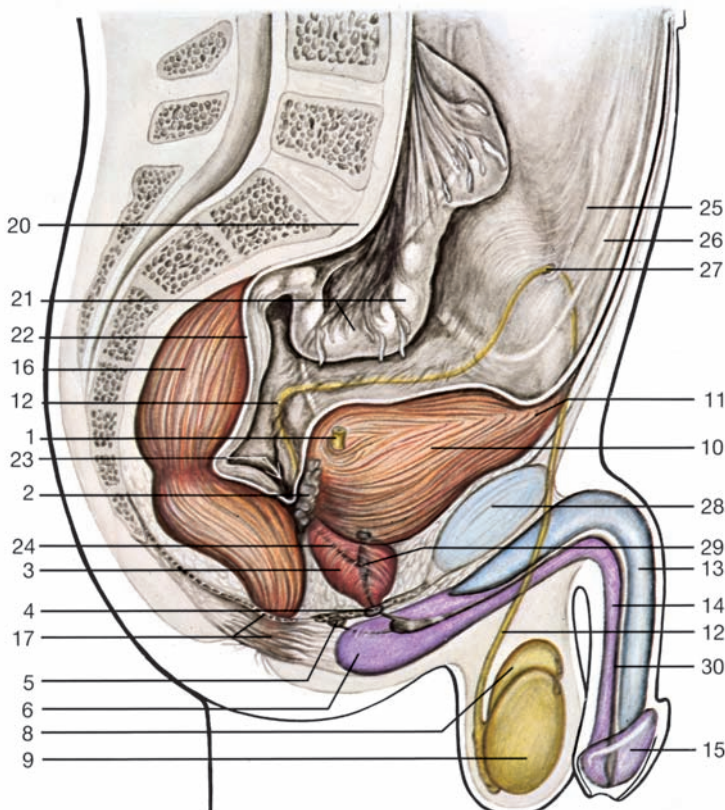
Midsagittal section through the pelvic cavity in the male (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



Male genital organs, isolated (right lateral aspect).

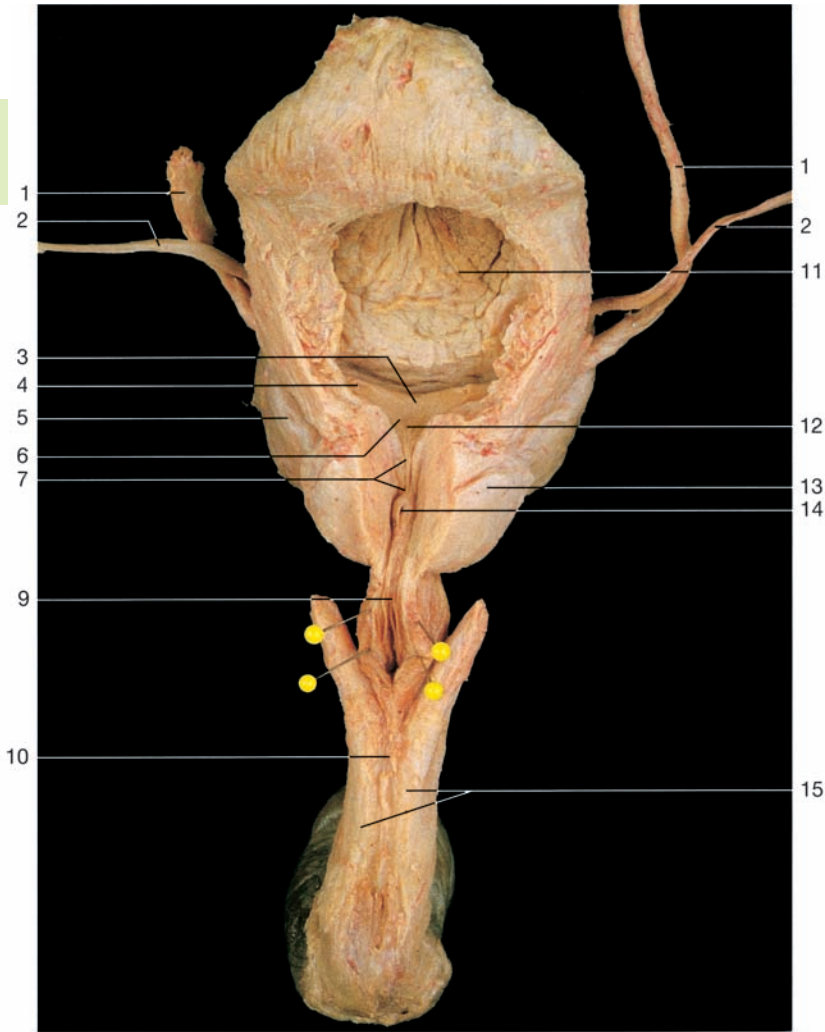


Male genital organs in situ (right lateral aspect).



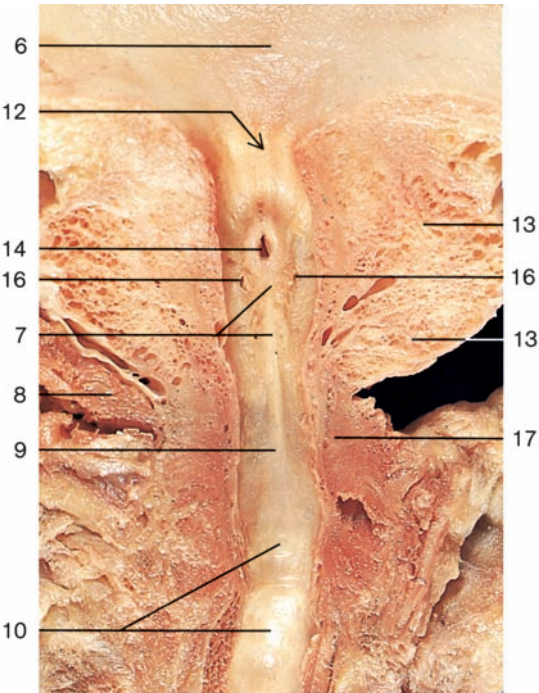
Positions of male genital organs (right lateral aspect).

- 1 Ureter
- 2 Seminal vesicle
- 3 Prostate gland
- 4 Urogenital diaphragm and membranous part of urethra
- 5 Bulbo-urethral gland (Cowper's gland)
- 6 Bulb of penis
- 7 Left and right crus penis
- 8 Epididymis
- 9 Testis
- 10 Urinary bladder
- 11 Apex of urinary bladder
- 12 Ductus deferens
- 13 Corpus cavernosum of penis
- 14 Corpus spongiosum of penis
- 15 Glans penis
- 16 Ampulla of rectum
- 17 Levator ani muscle
- 18 Anal canal and external anal sphincter muscle
- 19 Spermatic cord (cut)
- 20 Sacral promontory
- 21 Sigmoid colon
- 22 Peritoneum (cut edge)
- 23 Rectovesical pouch
- 24 Ejaculatory duct
- 25 Lateral umbilical fold
- 26 Medial umbilical fold
- 27 Deep inguinal ring and ductus deferens
- 28 Pubic symphysis
- 29 Prostatic part of urethra
- 30 Spongy urethra

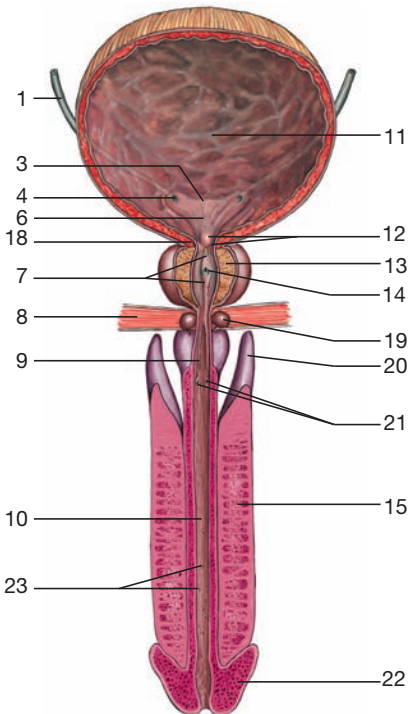


- 1 Ureter
- 2 Ductus deferens
- 3 Interureteric fold
- 4 Ureteric orifice
- 5 Seminal vesicle
- 6 Trigone of urinary bladder
- 7 Prostatic urethra with seminal colliculus and urethral crest
- 8 Deep transverse perineal muscle
- 9 Membranous urethra
- 10 Spongy urethra
- 11 Mucous membrane of urinary bladder
- 12 Internal urethral orifice and uvula of urinary bladder
- 13 Prostate
- 14 Prostatic utricle
- 15 Right and left corpus cavernosum of penis
- 16 Ejaculatory duct
- 17 Sphincter urethrae muscle
- 18 Sphincter muscle of urinary bladder
- 19 Bulbo-urethral gland (Cowper's gland)
- 20 Crus penis
- 21 Orifices of bulbo-urethral glands
- 22 Glans penis
- 23 Ureteric orifices

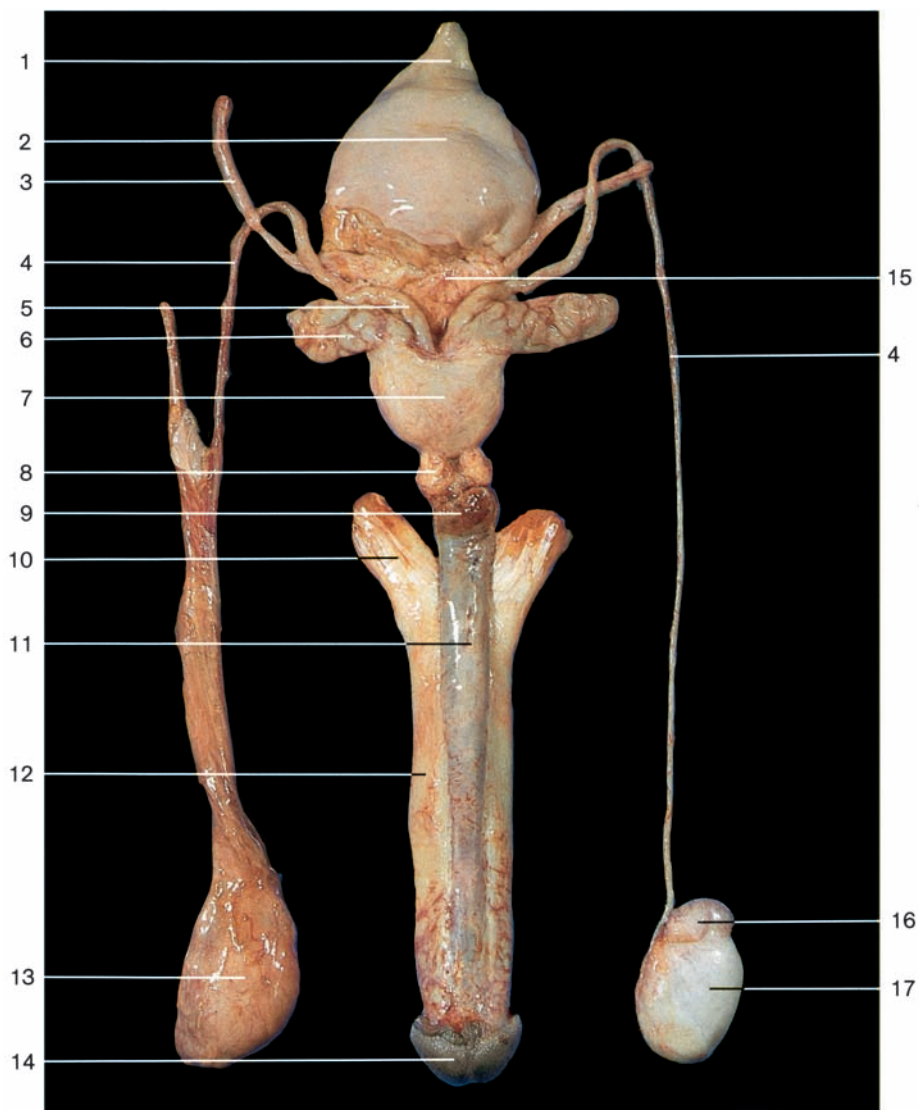
Male genital organs and urinary bladder, isolated (anterior aspect). Urinary bladder, prostate, and urethra have been opened. The urinary bladder is contracted.



Posterior half of male urethra and prostate in continuity with the neck of urinary bladder (anterior aspect).

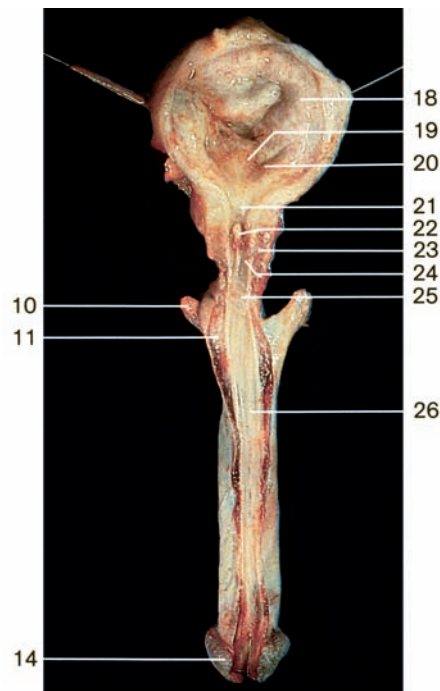


Male genital organs and urinary bladder (anterior aspect). Urinary bladder, urethra, and penis have been dissected.

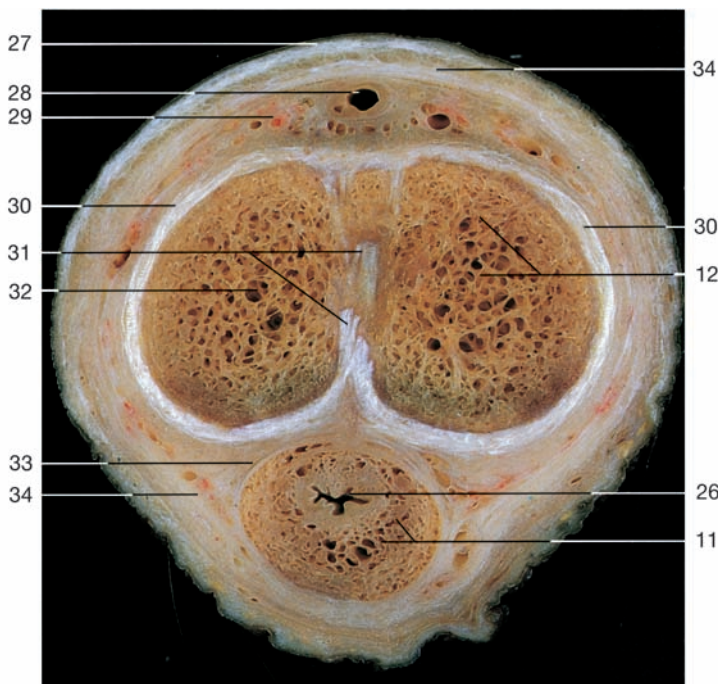


- 1 Apex of urinary bladder with urachus
- 2 Urinary bladder
- 3 Ureter
- 4 Ductus deferens
- 5 Ampulla of ductus deferens
- 6 Seminal vesicle
- 7 Prostate
- 8 Bulbo-urethral gland (Cowper's gland)
- 9 Bulb of penis
- 10 Crus penis
- 11 Corpus spongiosum of penis
- 12 Corpus cavernosum of penis
- 13 Testis and epididymis with coverings
- 14 Glans penis
- 15 Fundus of urinary bladder
- 16 Head of epididymis
- 17 Testis
- 18 Mucous membrane of bladder
- 19 Trigone of bladder
- 20 Ureteric orifice
- 21 Internal urethral orifice
- 22 Seminal colliculus
- 23 Prostate
- 24 Prostatic urethra
- 25 Membranous urethra
- 26 Spongy (penile) urethra
- 27 Skin of penis
- 28 Deep dorsal vein of penis (unpaired)
- 29 Dorsal artery of penis (paired)
- 30 Tunica albuginea of corpora cavernosa
- 31 Septum of penis
- 32 Deep artery of penis
- 33 Tunica albuginea of corpus spongiosum
- 34 Deep fascia of penis

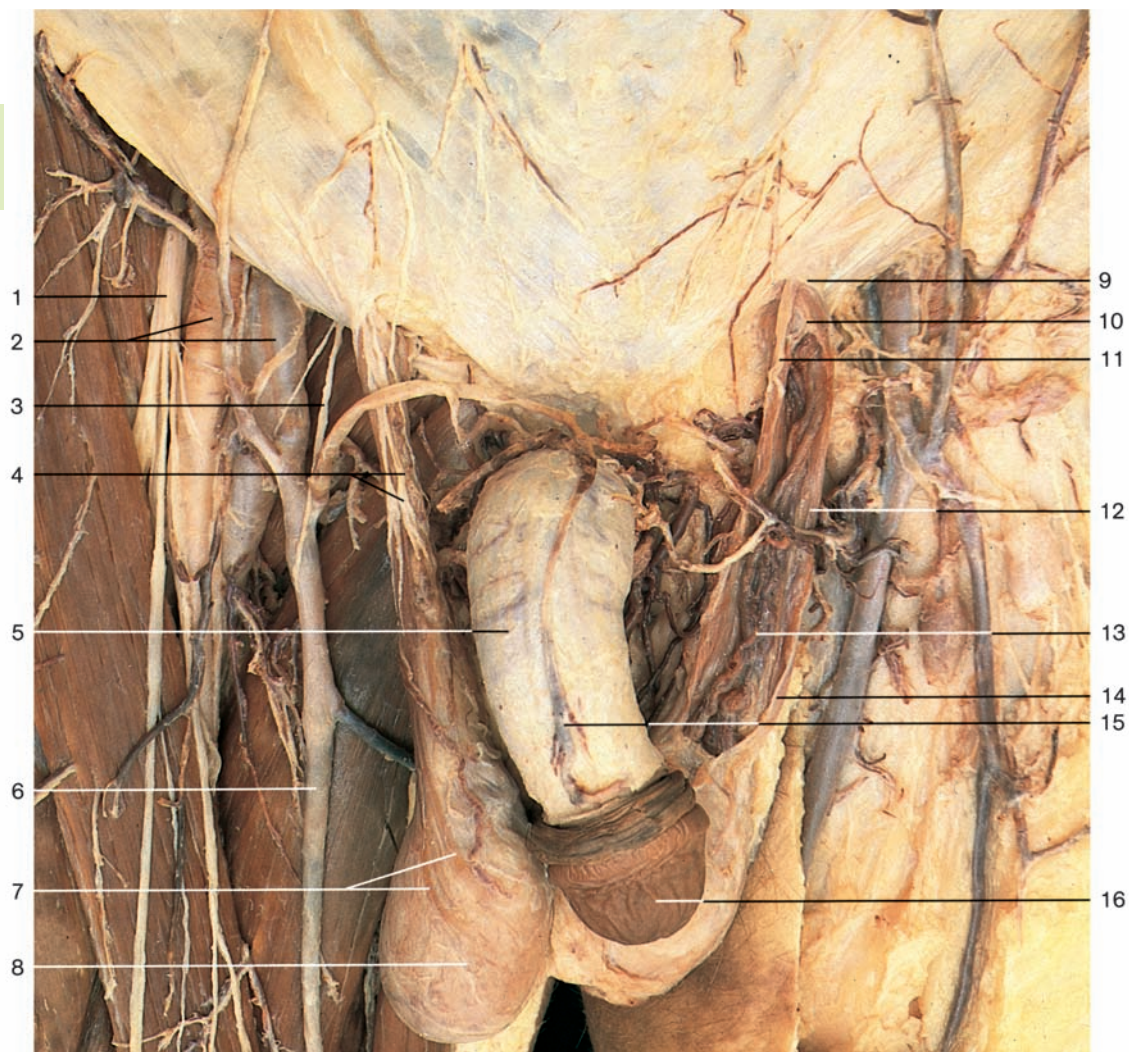
Male genital organs and urinary bladder, isolated (posterior aspect).



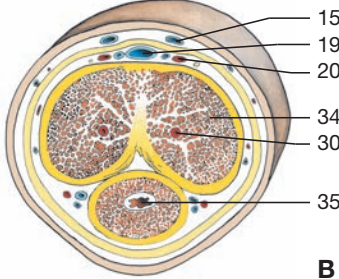
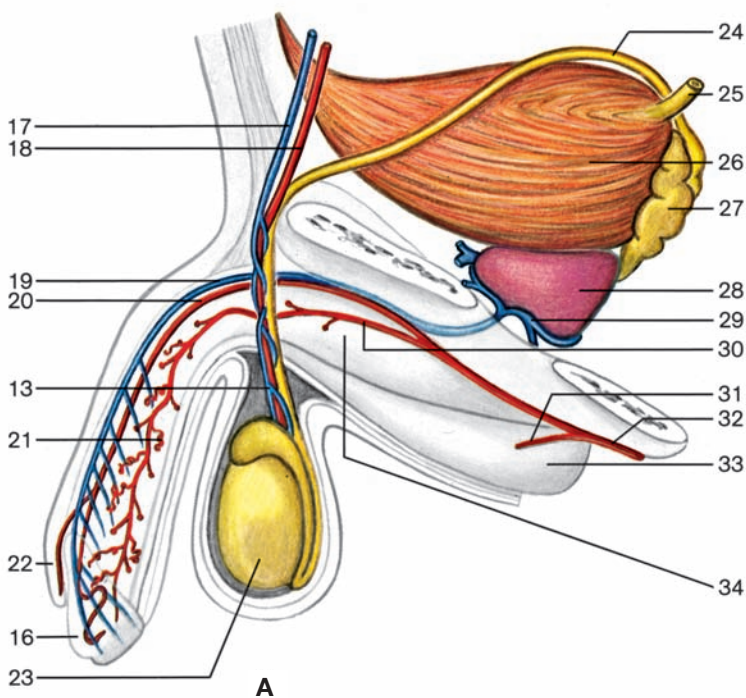
Urinary bladder, urethra, and penis (anterior aspect, opened longitudinally).



Cross section through the penis (inferior aspect).



Male external genital organs with penis, testis, and spermatic cord, superficial layer (anterior aspect).



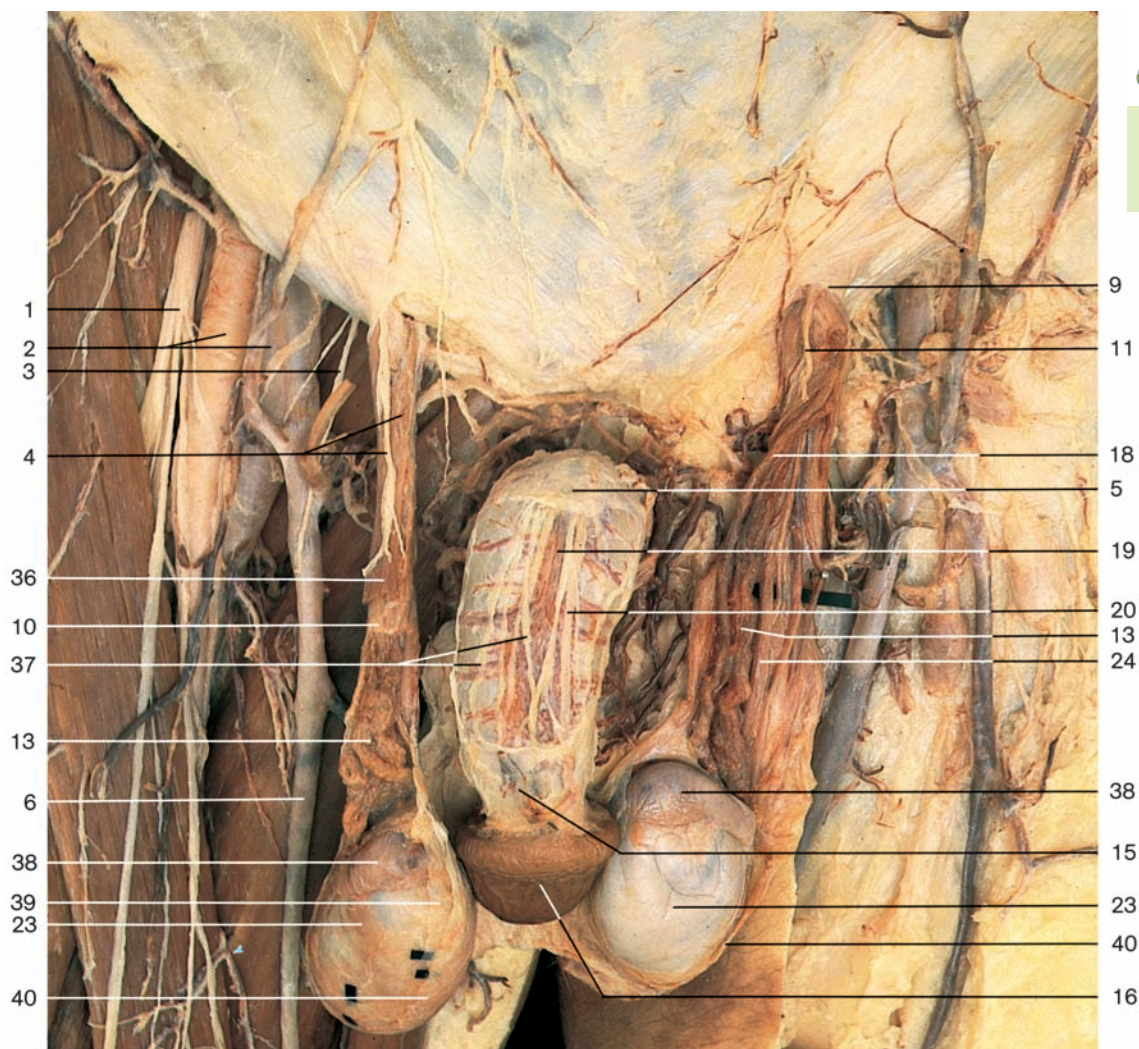
Vessels of male genital organs.

A = lateral aspect; B = cross section through the penis.

- 1 Femoral nerve
- 2 Femoral artery and vein
- 3 Femoral branch of genitofemoral nerve
- 4 Spermatic cord with genital branch of genitofemoral nerve
- 5 Penis with deep fascia
- 6 Great saphenous vein
- 7 Cremaster muscle
- 8 Testis with cremaster muscle
- 9 Superficial inguinal ring
- 10 Internal spermatic fascia (cut edge)
- 11 Ilio-inguinal nerve
- 12 Left spermatic cord
- 13 Pampiniform venous plexus
- 14 External spermatic fascia
- 15 Superficial dorsal vein of penis

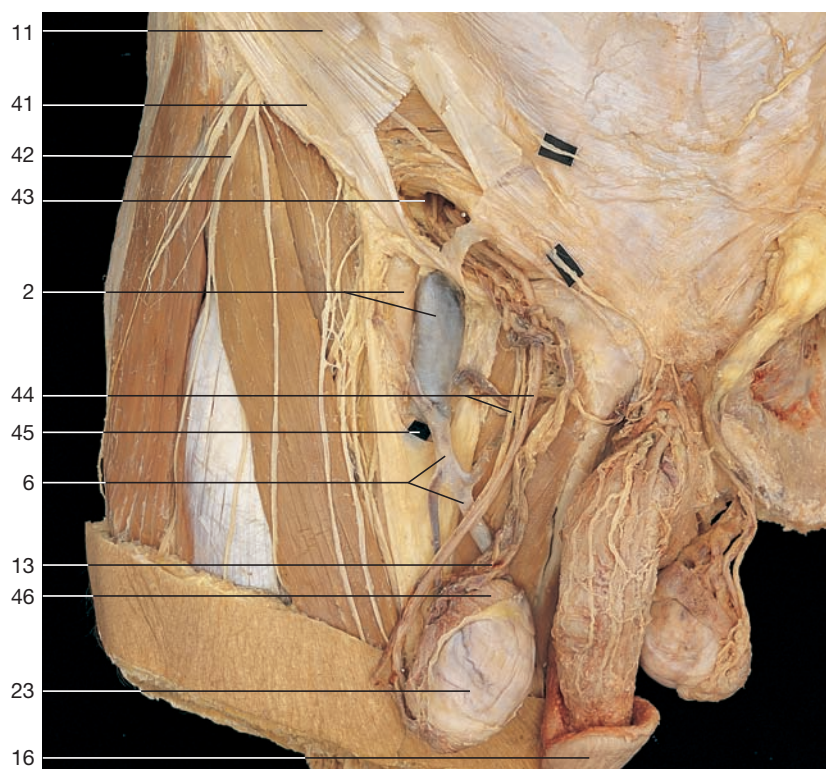


- 16 Glans penis
- 17 Testicular vein
- 18 Testicular artery
- 19 Deep dorsal vein of penis
- 20 Dorsal artery of penis
- 21 Helicine arteries
- 22 Prepuce
- 23 Testis with tunica albuginea



Male external genital organs with penis, testis, and spermatic cord, deeper layer (anterior aspect).
The deep fascia of the penis has been opened to display the dorsal nerves and vessels.

- 24 Ductus deferens
- 25 Ureter
- 26 Urinary bladder
- 27 Seminal vesicle
- 28 Prostate
- 29 Vesicoprostatic venous plexus
- 30 Deep artery of penis
- 31 Artery of bulb of penis
- 32 Internal pudendal artery
- 33 Corpus spongiosum of penis
- 34 Corpus cavernosum of penis
- 35 Urethra
- 36 Cremasteric fascia with cremaster muscle
- 37 Dorsal nerve of penis
- 38 Epididymis
- 39 Tunica vaginalis (visceral layer)
- 40 Tunica vaginalis (parietal layer)
- 41 Inguinal ligament
- 42 Femoral cutaneous nerve
- 43 Deep inguinal ring
- 44 Ductus deferens and testicular artery
- 45 Hiatus saphenous
- 46 Epididymis



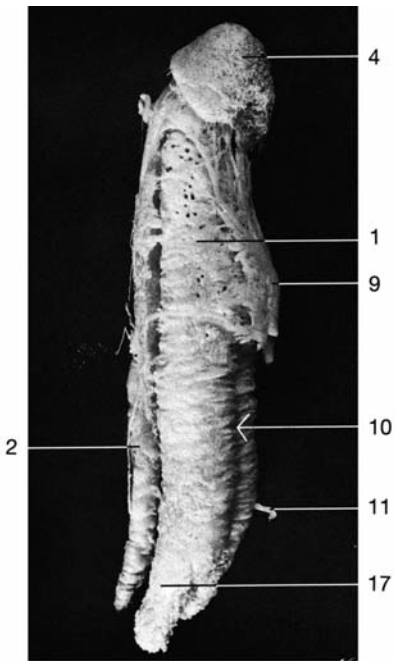
Male external genital organs and inguinal region (anterior aspect).
Dissection of the inguinal channel.



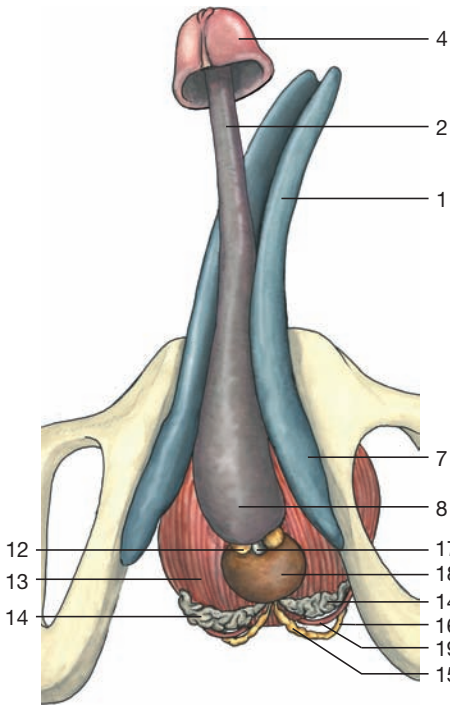
Male external genital organs (oblique-lateral aspect). The corpus spongiosum of the penis with the glans penis has been isolated and reflected.



Sagittal section through the pelvic cavity with the male genital organs (MRI scan). (From Heuck et al., MRT-Atlas, 2009.)

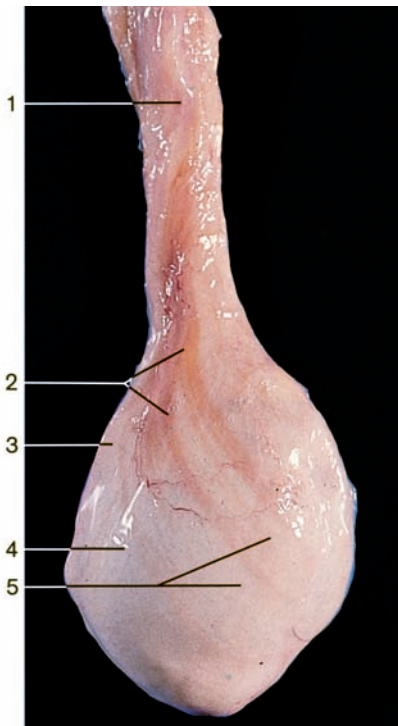


Resin cast of an erected penis.



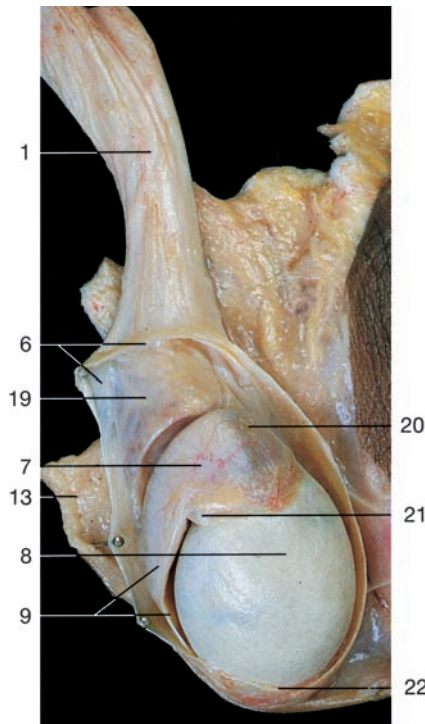
Male external genital organs and accessory glands.

- 1 Corpus cavernosum of penis
- 2 Corpus spongiosum of penis
- 3 Corona of glans penis
- 4 Glans penis
- 5 Suspensory ligament of penis
- 6 Pubis (inferior pubic ramus, dissected)
- 7 Crus penis
- 8 Bulb of penis
- 9 Dorsal vein of penis
- 10 Septum pectiniforme
- 11 Dorsal artery of penis
- 12 Bulbo-urethral gland (Cowper's gland)
- 13 Urinary bladder
- 14 Seminal vesicle
- 15 Ampulla of ductus deferens
- 16 Ductus deferens
- 17 Membranous urethra
- 18 Prostate
- 19 Ureter
- 20 Common iliac artery and vein
- 21 Fifth lumbar vertebral body
- 22 Intestinal loops
- 23 Rectus abdominis muscle
- 24 Pubic symphysis
- 25 Root of penis
- 26 Sacrum
- 27 Ampulla of rectum
- 28 Anal canal
- 29 External anal sphincter muscle



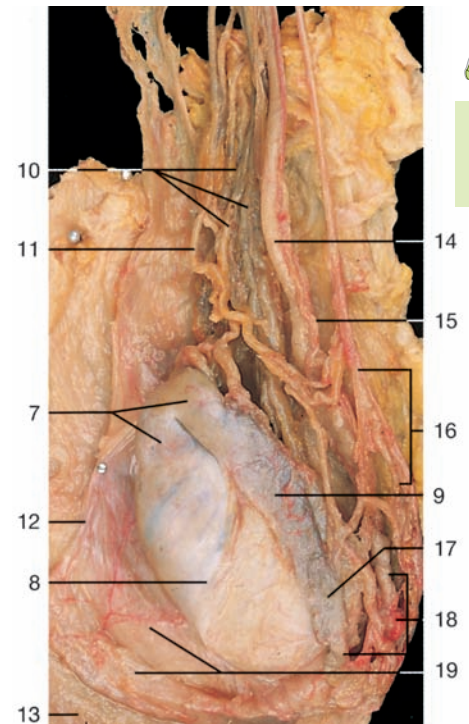
Testis and epididymis with investing layers (lateral aspect).

- 1 Spermatic cord covered with cremasteric fascia
- 2 Cremaster muscle
- 3 Position of epididymis
- 4 Internal spermatic fascia
- 5 Position of testis
- 6 Internal spermatic fascia with adjacent investing layers of testis (cut surface)



Testis and epididymis (lateral aspect). The tunica vaginalis has been opened.

- 7 Head of epididymis
- 8 Testis with tunica vaginalis (visceral layer)
- 9 Body of epididymis
- 10 Pampiniform venous plexus (anterior veins)
- 11 Testicular artery
- 12 Tunica vaginalis (parietal layer, cut edge)
- 13 Skin and dartos muscle (reflected)
- 14 Ductus deferens



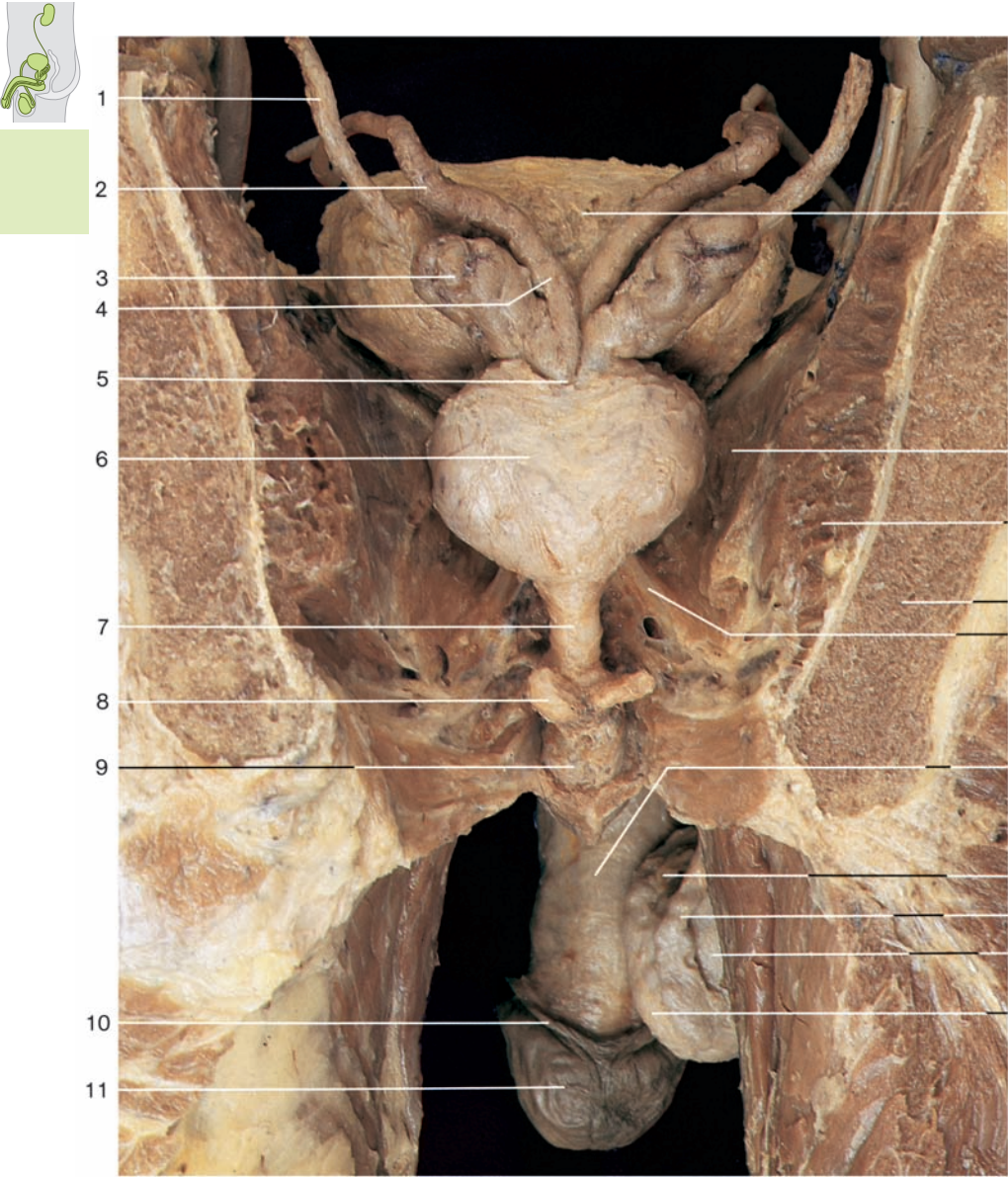
Testis, epididymis, and spermatic cord (left side, postero-lateral aspect). Dissection of spermatic cord and ductus deferens.

- 15 Artery of ductus deferens
- 16 Posterior veins of pampiniform plexus
- 17 Tail of epididymis
- 18 Transition of epididymal duct to ductus deferens and venous plexus
- 19 Parietal layer of tunica vaginalis
- 20 Appendix of epididymis
- 21 Appendix of testis
- 22 Gubernaculum testis

Longitudinal section through testis and epididymis. The left figure shows the testicular septa after removal of the seminiferous tubules.

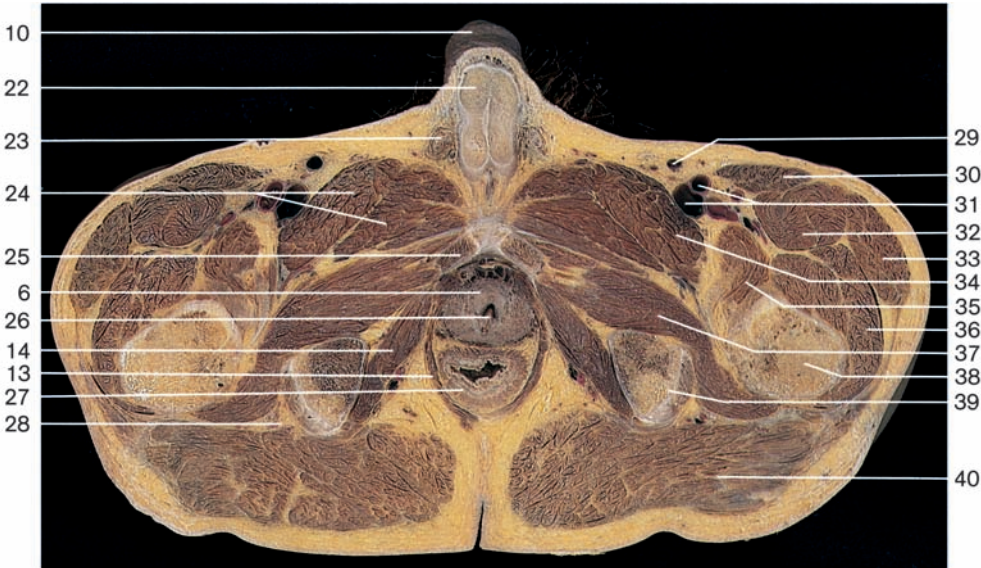
- 1 Spermatic cord (cut surface)
- 2 Head of epididymis (cut surface)
- 3 Septa of testis
- 4 Mediastinum testis
- 5 Tunica albuginea
- 6 Superior pole of testis
- 7 Convoluted seminiferous tubules
- 8 Inferior pole of testis



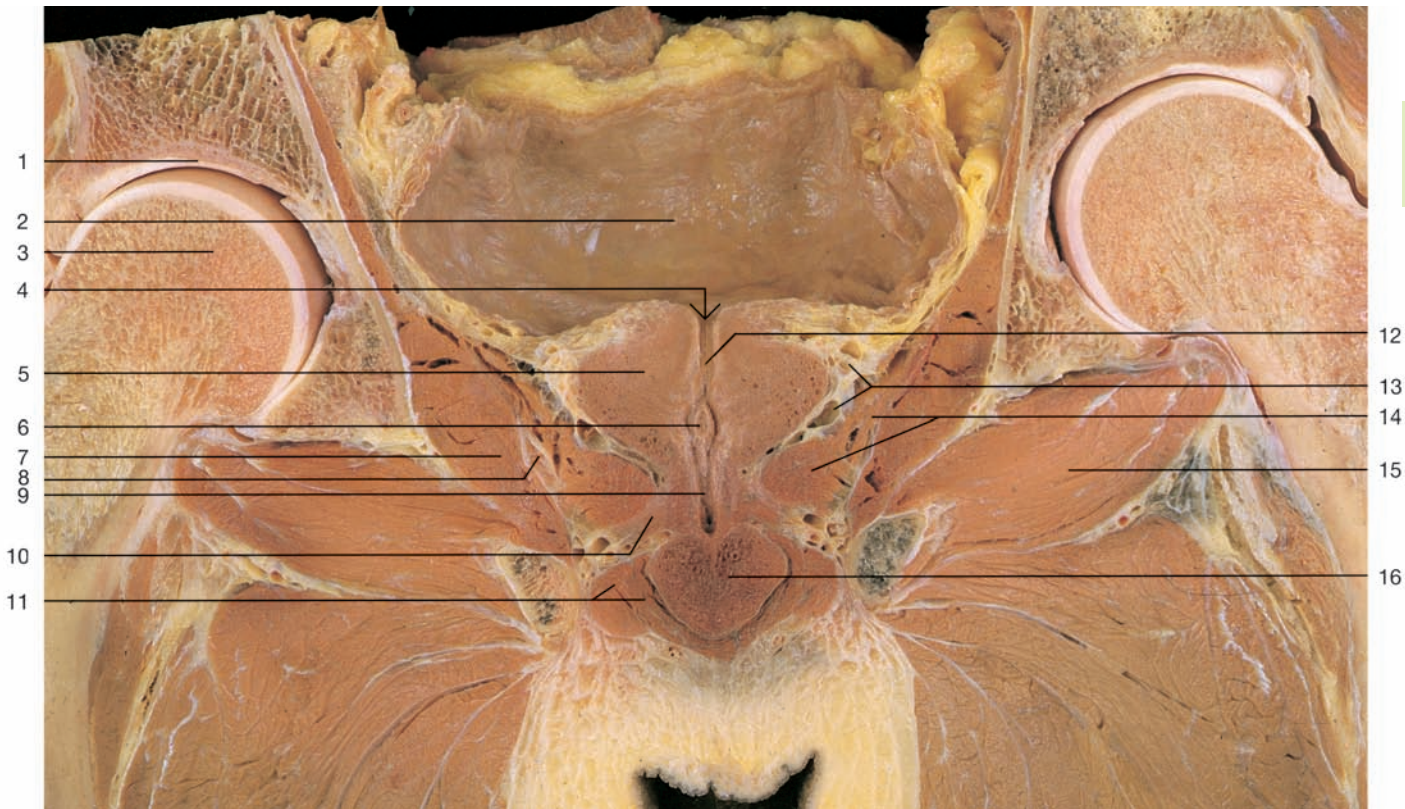


Accessory glands of male genital organs. Coronal section through the pelvic cavity. Posterior aspect of urinary bladder, prostate, and seminal vesicles.

- 1 Ureter
- 2 Ductus deferens
- 3 Seminal vesicle
- 4 Ampulla of ductus deferens
- 5 Ejaculatory duct (proximal portion)
- 6 Prostate
- 7 Membranous urethra
- 8 Bulbo-urethral gland (Cowper's gland)
- 9 Bulb of penis
- 10 Penis
- 11 Glans penis
- 12 Urinary bladder
- 13 Levator ani muscle
- 14 Obturator internus muscle
- 15 Pelvic bone (cut edge)
- 16 Puboprostatic ligament
- 17 Corpus spongiosum of penis
- 18 Head of epididymis
- 19 Beginning of ductus deferens
- 20 Testis
- 21 Tail of epididymis
- 22 Corpus cavernosum of penis
- 23 Spermatic cord
- 24 Pectineus and adductor muscles
- 25 Pubis
- 26 Prostatic part of urethra (seminal colliculus)
- 27 Rectum
- 28 Sciatic nerve
- 29 Great saphenous vein
- 30 Sartorius muscle
- 31 Femoral artery and vein
- 32 Rectus femoris muscle
- 33 Tensor fasciae latae muscle
- 34 Pectineus muscle
- 35 Iliopsoas muscle
- 36 Vastus lateralis muscle
- 37 Obturator externus muscle
- 38 Femur
- 39 Ischial tuberosity
- 40 Gluteus maximus muscle

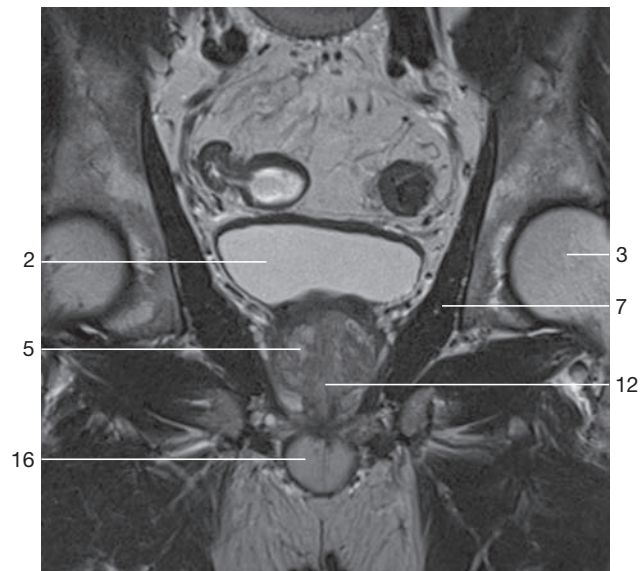


Horizontal section through the pelvic cavity in the male at the level of prostate.

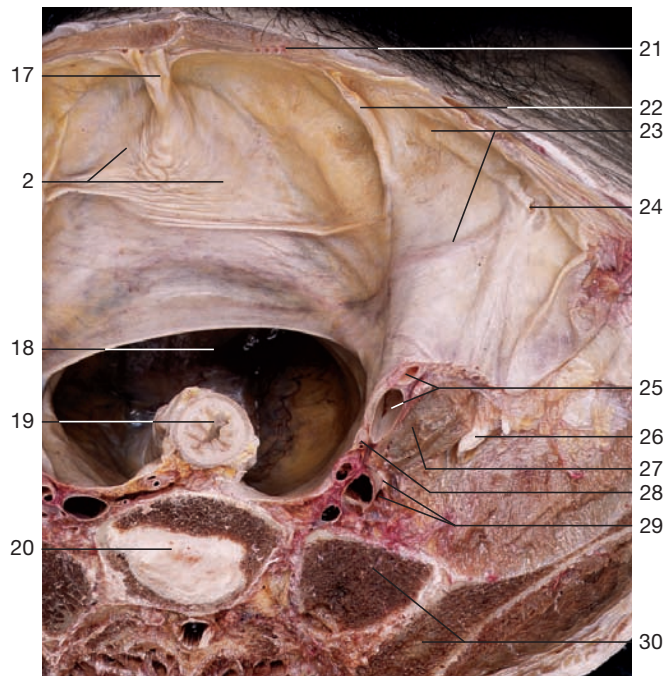


Coronal section through the pelvic cavity in the male at the level of prostate and hip joint (anterior aspect).

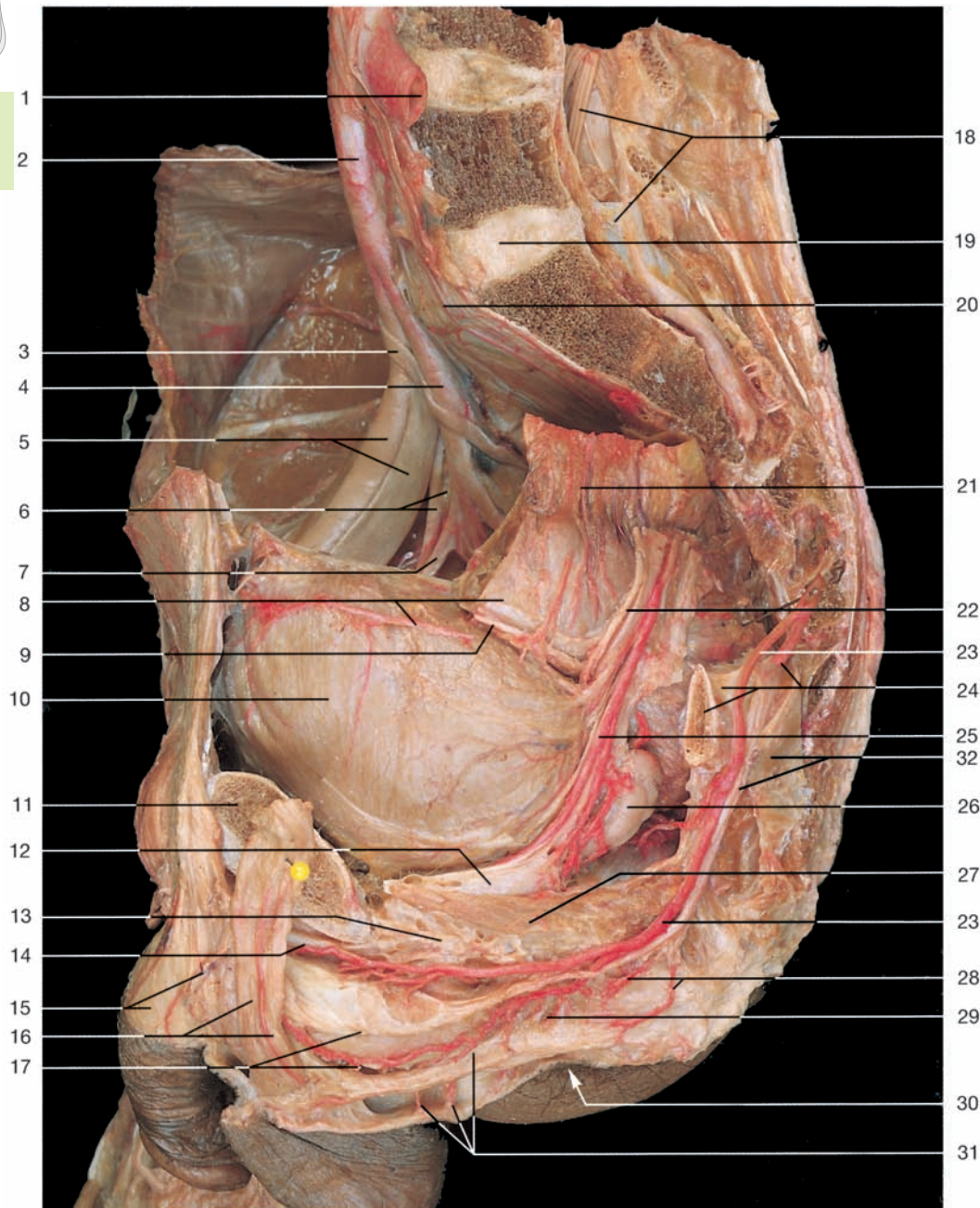
- | | | |
|---|--|---|
| 1 Acetabulum of hip joint | 12 Prostatic part of urethra | 22 Medial umbilical fold with remnant of umbilical artery |
| 2 Urinary bladder | 13 Prostatic plexus | 23 Deep inguinal ring and ductus deferens |
| 3 Head of femur | 14 Levator ani muscle | 24 Deep iliac circumflex artery |
| 4 Internal urethral orifice | 15 Obturator externus muscle | 25 External iliac artery and vein |
| 5 Prostate | 16 Bulb of penis | 26 Femoral nerve |
| 6 Seminal colliculus | 17 Median umbilical fold with remnant of urachus | 27 Iliopsoas muscle |
| 7 Obturator internus muscle | 18 Rectovesical pouch | 28 Ureter |
| 8 Ischiorectal fossa | 19 Rectum | 29 Obturator nerve and internal iliac artery |
| 9 Membranous urethra | 20 Sacrum | 30 Ilium and sacrum |
| 10 Deep transverse perineal muscle | 21 Inferior epigastric artery | |
| 11 Crus penis and ischiocavernosus muscle | | |



Coronal section through the pelvic cavity in the male (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

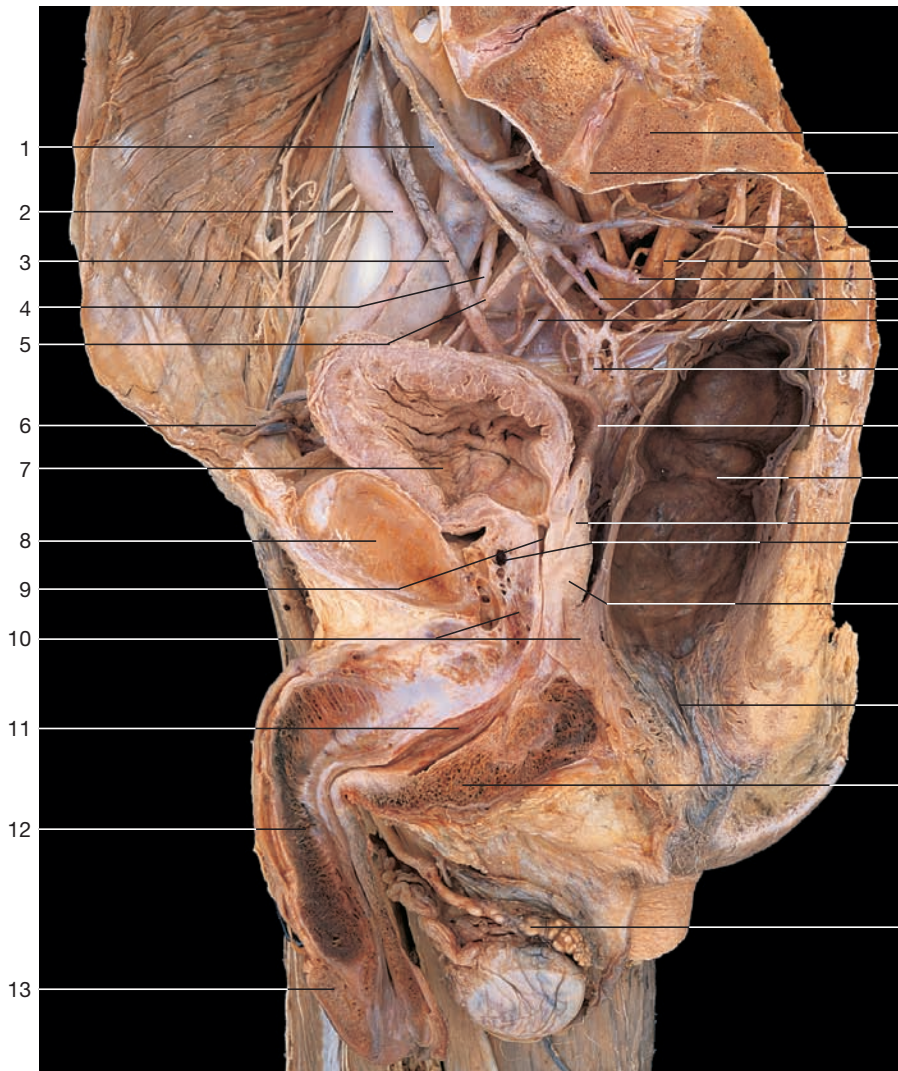


Pelvic cavity in the male (from above).

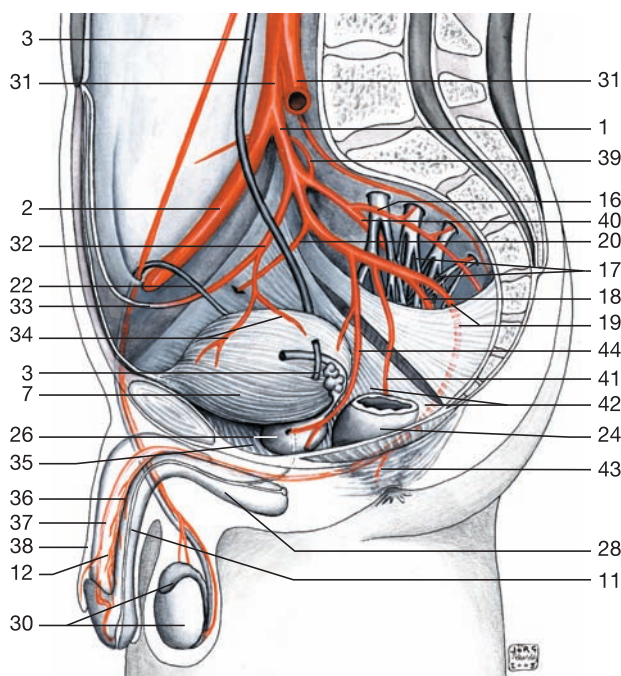


Vessels of the pelvic cavity in the male (right half, parasagittal section). The arteries have been injected with red resin. The parietal layer of peritoneum has been removed. The urinary bladder is filled to a great extent.

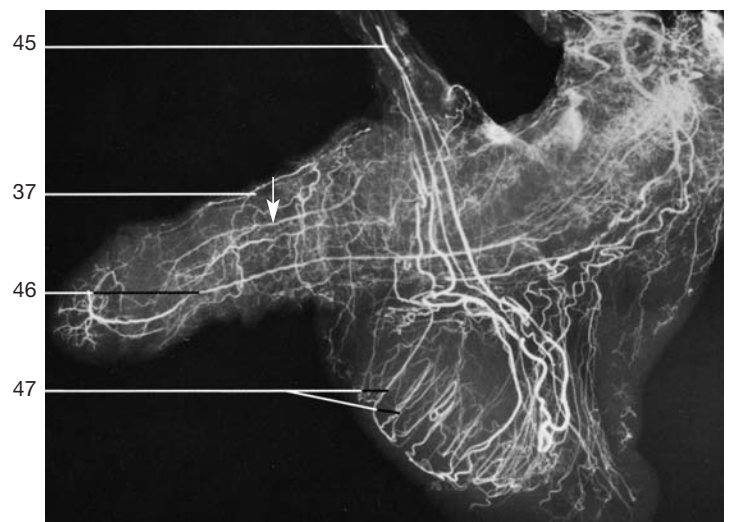
- | | |
|---|---|
| 1 Left common iliac artery | 18 Cauda equina and dura mater (divided) |
| 2 Right common iliac artery | 19 Intervertebral disc between fifth lumbar vertebra and sacrum |
| 3 Right ureter | 20 Sacral promontory |
| 4 Right internal iliac artery | 21 Mesosigmoid |
| 5 Right external iliac artery and vein | 22 Left ureter |
| 6 Right obturator artery and nerve | 23 Left internal pudendal artery |
| 7 Umbilical artery | 24 Ischial spine (cut), sacrospinal ligament, and inferior gluteal artery |
| 8 Sigmoid and superior vesical artery | 25 Left inferior vesical artery |
| 9 Left ductus deferens | 26 Seminal vesicle |
| 10 Urinary bladder | 27 Levator ani muscle |
| 11 Pubis (cut) | 28 Branches of inferior rectal artery |
| 12 Prostate | 29 Perineal artery |
| 13 Vesicoprostatic venous plexus | 30 Anus |
| 14 Deep dorsal vein of penis and dorsal artery of penis | 31 Posterior scrotal branches |
| 15 Penis and superficial dorsal vein | 32 Pudendal nerve and sacrotuberal ligament |
| 16 Spermatic cord and testicular artery | |
| 17 Bulb of penis and deep artery of penis | |



Vessels of the pelvic cavity in the male (medial aspect, midsagittal section). The gluteus maximus muscle has been removed.

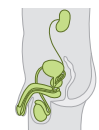


Main branches of internal iliac artery in the male (lateral aspect).



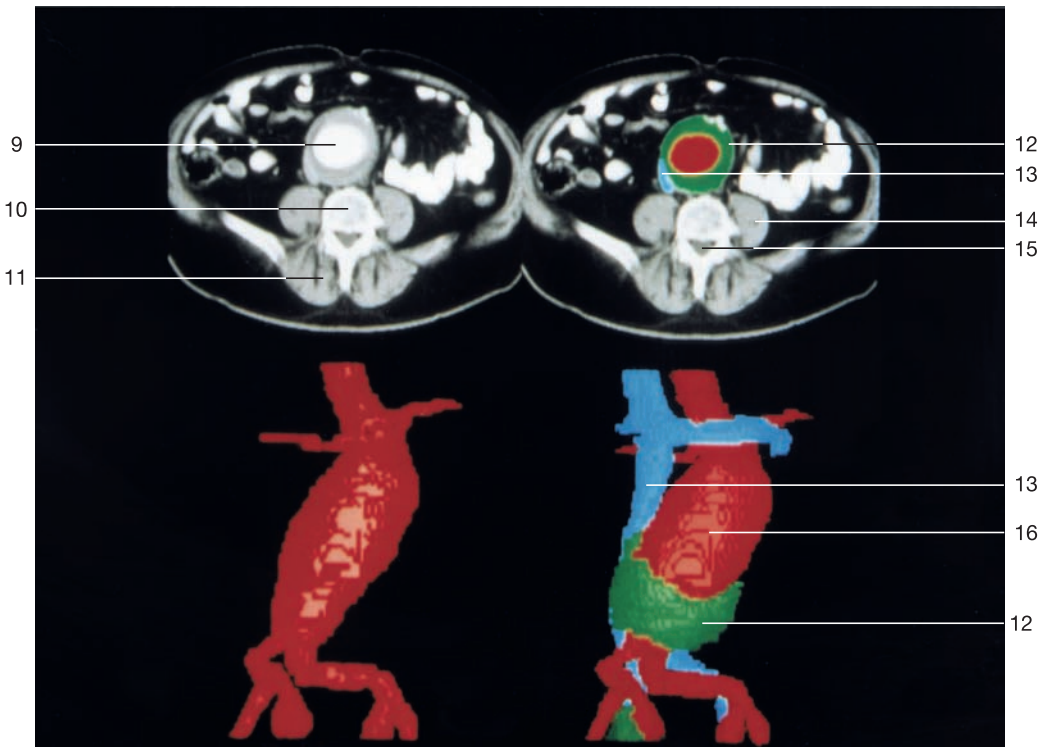
Arteriography of male genital organs (lateral aspect).
Arrow: helicine artery.

- 1 Internal iliac artery
- 2 External iliac artery
- 3 Ureter
- 4 Obturator nerve
- 5 Umbilical artery
- 6 Deep inguinal ring
- 7 Urinary bladder (vesica urinaria)
- 8 Symphysis
- 9 Prostatic part of urethra
- 10 Sphincter muscle of urethra
- 11 Urethra (spongy part)
- 12 Cavernous body of penis
- 13 Glans penis
- 14 Sacrum
- 15 Promontory
- 16 Lateral sacral artery
- 17 Plexus sacralis
- 18 Inferior gluteal artery
- 19 Internal pudendal artery
- 20 Obturator artery
- 21 Inferior hypogastric plexus
- 22 Ductus deferens
- 23 Seminal vesicle (vesicula seminalis)
- 24 Rectum
- 25 Prostatic venous plexus
- 26 Prostate
- 27 Anal canal
- 28 Spongy part of penis
- 29 Pampiniform plexus
- 30 Testis and epididymis
- 31 Common iliac artery
- 32 Umbilical artery
- 33 Medial umbilical ligament
- 34 Branches of superior vesical artery
- 35 Urogenital diaphragm
- 36 Deep artery of penis
- 37 Dorsal artery of penis
- 38 Penis
- 39 Iliolumbar artery
- 40 Superior gluteal artery
- 41 Middle rectal artery
- 42 Levator ani muscle
- 43 Inferior rectal artery
- 44 Inferior vesical artery
- 45 Testicular artery
- 46 Artery of bulb of penis
- 47 Septum of penis



- 1 Twelfth thoracic vertebra (Th₁₂)
- 2 Twelfth rib (rib XII)
- 3 Inferior mesenteric artery
- 4 Fourth lumbar vertebra (L₄)
- 5 Sacrum
- 6 Sacro-iliac articulation
- 7 Aorta (abdominal part)
- 8 Left common iliac artery (included into the aneurysm)
- 9 Aorta with aneurysm
- 10 Body of lumbar vertebra
- 11 Intrinsic muscles of the back
- 12 Thrombotic part of the aneurysm (green)
- 13 Inferior vena cava (compressed, blue)
- 14 Iliopsoas muscle
- 15 Vertebral canal
- 16 Aneurysm of the aorta (red)

Abdominal part of the aorta showing an infrarenal aneurysm with involvement of both iliac arteries (arrows; 3-D reconstruction). (Courtesy of Prof. Rupprecht and Dr. Rexer, Klinikum Fürth, Germany.)

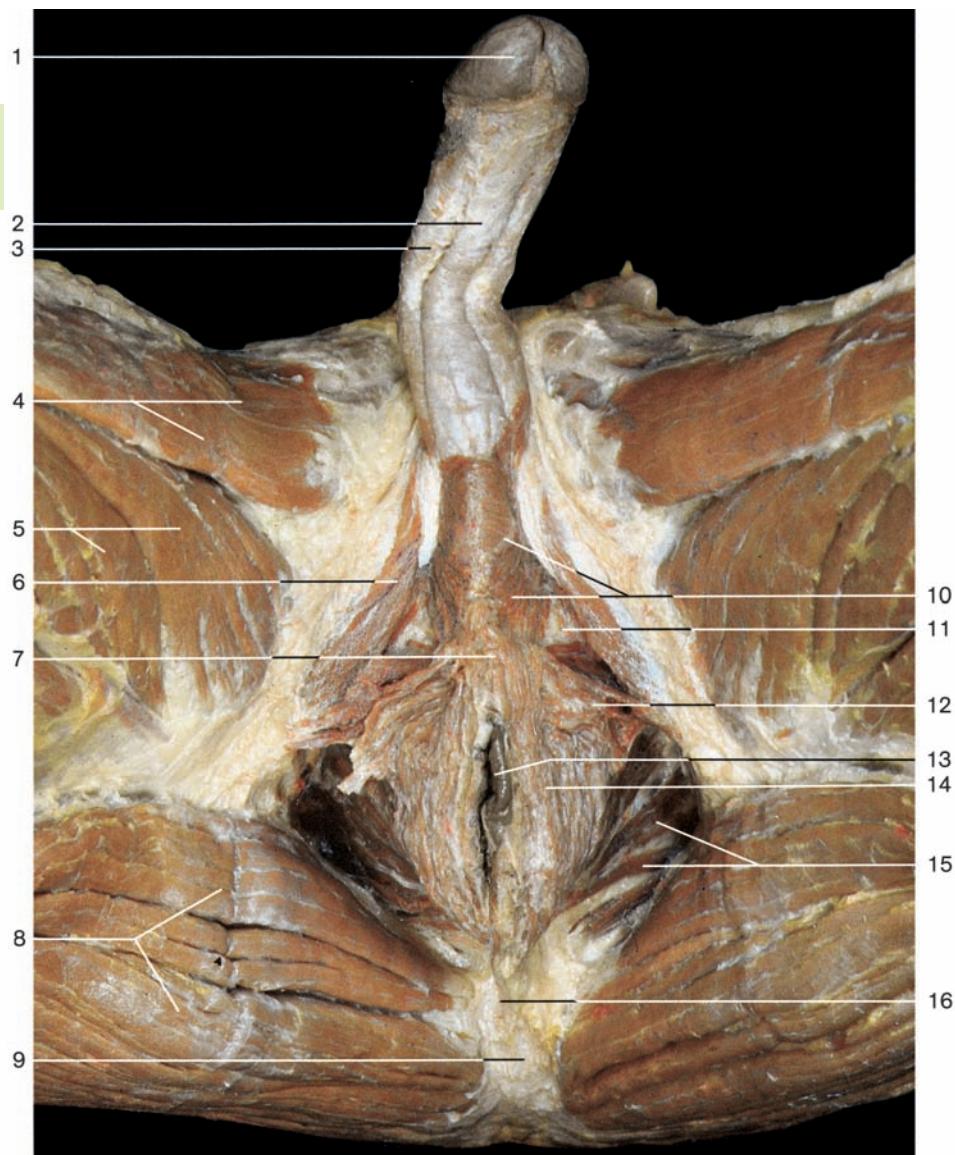


Abdominal part of the aorta with an aneurysm, after injection of contrast medium. Above = horizontal sections through the abdominal cavity, showing different contrast medium concentrations within the aorta and the aneurysm; below = 3-D reconstruction of the aneurysm; red = aorta; green = thrombotic areas; blue = inferior vena cava (partly compressed).



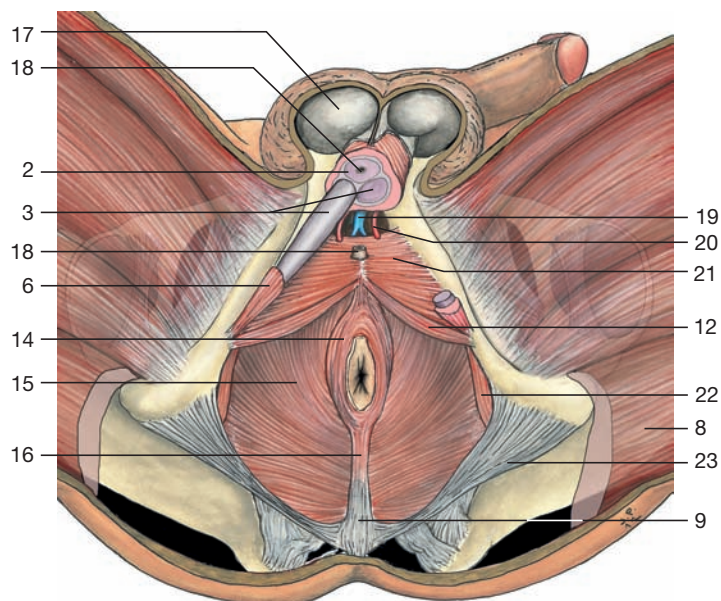
Vessels and nerves of the pelvic cavity in the male (medial aspect, midsagittal section). The rectum was reflected to display the inferior hypogastric plexus.

- | | | |
|--|------------------------------|---|
| 1 External iliac artery | 10 Prostatic part of urethra | 20 Pelvic splanchnic nerves (nervi erigentes) |
| 2 Right hypogastric nerve | 11 Prostatic venous plexus | 21 Levator ani muscle |
| 3 Ureter | 12 Sphincter urethrae muscle | 22 Inferior hypogastric plexus (pelvic plexus) |
| 4 Internal iliac artery | 13 Spongy part of urethra | 23 Prostate |
| 5 Inferior gluteal artery and internal pudendal artery | 14 Corpus spongiosum penis | 24 Rectum (reflected) |
| 6 Obturator artery | 15 Corpus cavernosum penis | 25 Anal canal and external anal sphincter muscle |
| 7 Urinary bladder | 16 Glans penis | 26 Pampiniform plexus continuous with testicular vein |
| 8 Ductus deferens | 17 Sacrum | 27 Testis and epididymis |
| 9 Symphysis pubica | 18 Lateral sacral artery | |
| | 19 Sacral plexus | |



- 1 Glans penis
- 2 Corpus spongiosum of penis
- 3 Corpus cavernosum of penis
- 4 Gracilis muscle
- 5 Adductor muscles
- 6 Ischiocavernosus muscle overlying crus of penis
- 7 Perineal body
- 8 Gluteus maximus muscle
- 9 Coccyx
- 10 Bulbospongiosus muscle
- 11 Deep transverse perineus muscle covered by inferior fascia of urogenital diaphragm
- 12 Superficial transverse perineus muscle
- 13 Anus
- 14 External anal sphincter muscle
- 15 Levator ani muscle
- 16 Anococcygeal ligament
- 17 Testis
- 18 Urethra
- 19 Deep dorsal vein of penis
- 20 Dorsal artery of penis
- 21 Deep transverse perineal muscle
- 22 Obturator internus muscle
- 23 Sacrotuberal ligament

Urogenital diaphragm and external genital organs in the male with muscles of the pelvic floor (from below).

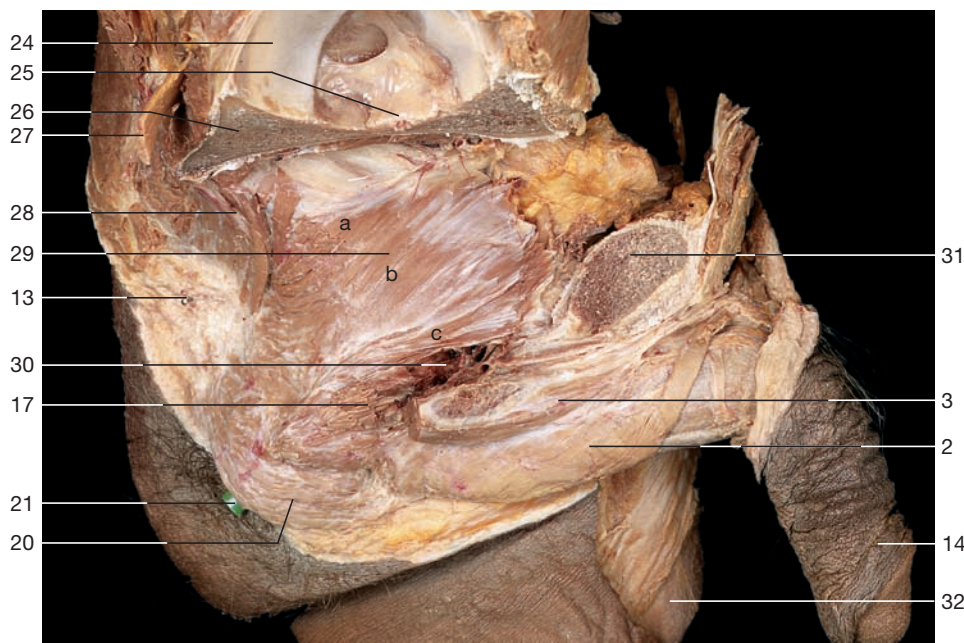


Urogenital and anal regions in the male (from below). Muscles of urogenital and pelvic diaphragms.



- 1 Right testis (reflected laterally and upward)
- 2 Bulbospongiosus muscle
- 3 Ischiocavernosus muscle
- 4 Adductor magnus muscle
- 5 Posterior scrotal nerves and superficial perineal arteries
- 6 Posterior scrotal artery and vein
- 7 Right artery of bulb of penis
- 8 Perineal body
- 9 Perineal branches of pudendal nerve
- 10 Pudendal nerve and internal pudendal artery
- 11 Inferior rectal arteries and nerves
- 12 Inferior cluneal nerves
- 13 Coccyx (location)
- 14 Penis
- 15 Left testis (reflected laterally)
- 16 Left posterior scrotal artery
- 17 Deep transverse perineal muscle
- 18 Left artery of bulb of penis
- 19 Branch of posterior femoral cutaneous nerve
- 20 External anal sphincter muscle
- 21 Anus
- 22 Gluteus maximus muscle
- 23 Anococcygeal nerves
- 24 Acetabulum (femur removed)
- 25 Ligament of femoral head
- 26 Body of ischium (cut)
- 27 Sciatic nerve
- 28 Coccygeus muscle
- 29 Levator ani muscle
 - a Iliococcygeus muscle
 - b Pubococcygeus muscle
 - c Puborectalis muscle
- 30 Prostatic venous plexus
- 31 Pubis
- 32 Testis

Urogenital diaphragm and external genital organs in the male with vessels and nerves (from below). The testes have been reflected laterally.

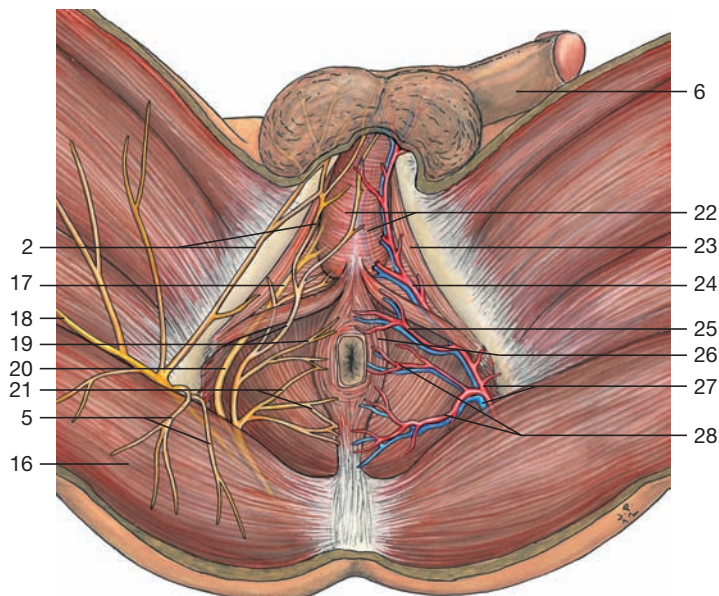


Pelvic diaphragm and external genital organs in the male (lateral aspect). The right half of the pelvis including the obturator internus muscle and femur have been removed to display the right half of the levator ani muscle.



- 1 Right testis (reflected)
- 2 Posterior scrotal nerves
- 3 Left crus penis with ischiocavernosus muscle
- 4 Anus
- 5 Inferior cluneal nerves
- 6 Penis
- 7 Left testis (reflected)
- 8 Dorsal artery and nerve of penis
- 9 Urethra
- 10 Deep transverse perineus muscle
- 11 Perineal branches of pudendal nerve
- 12 Artery of bulb of penis (reflected)
- 13 Branch of posterior femoral cutaneous nerve
- 14 Internal pudendal artery and pudendal nerve
- 15 Inferior rectal arteries and nerves
- 16 Gluteus maximus muscle
- 17 Dorsal nerve of penis
- 18 Posterior femoral cutaneous nerve
- 19 Perineal and anal branches of pudendal nerve
- 20 Pudendal nerve
- 21 Inferior rectal nerves
- 22 Bulbospongiosus muscle
- 23 Ischiocavernosus muscle
- 24 Dorsal artery of penis
- 25 Perineal artery
- 26 External anal sphincter muscle
- 27 Internal pudendal artery and vein
- 28 Inferior rectal arteries

Urogenital diaphragm and external genital organs in the male (from below). The left crus penis has been isolated and reflected laterally together with the bulb of the penis. The urethra has been cut.



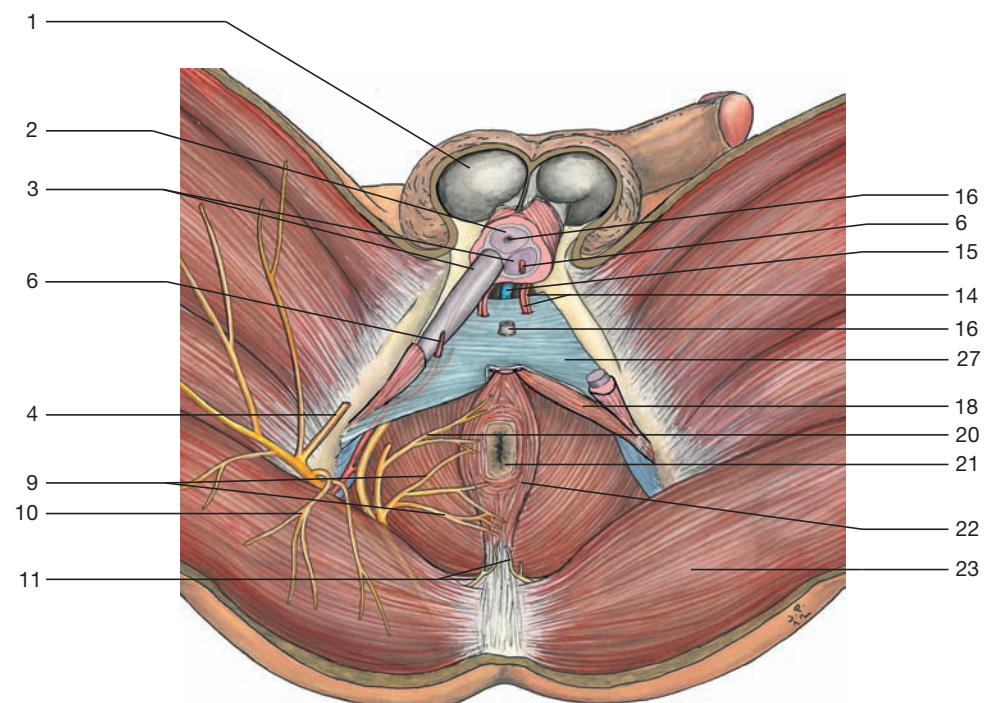
Urogenital and anal regions in the male (from below). Right side: nerves; left side: arteries and veins.



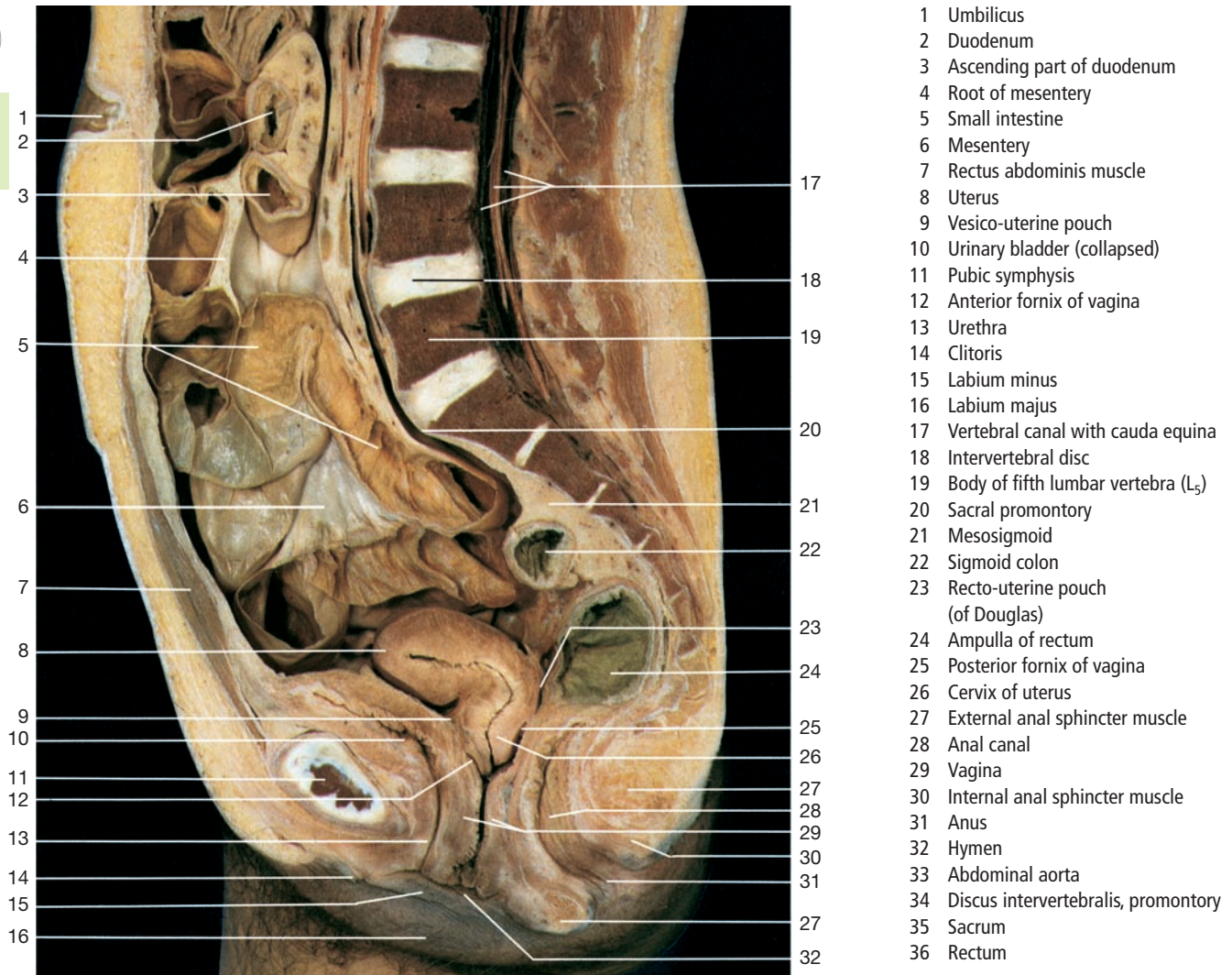
- 1 Right testis (reflected)
- 2 Corpus spongiosum of penis
- 3 Corpus cavernosum of penis
- 4 Perineal branch of posterior femoral cutaneous nerve
- 5 Posterior scrotal arteries and nerves
- 6 Deep artery of penis
- 7 Deep transverse perineal muscle
- 8 Right perineal nerves
- 9 Inferior rectal nerves
- 10 Inferior cluneal nerve
- 11 Anococcygeal nerves
- 12 Left spermatic cord
- 13 Left testis (cut surface)
- 14 Dorsal artery and nerve of penis
- 15 Deep dorsal vein of penis
- 16 Urethra (cut)
- 17 Artery of bulb of penis
- 18 Superficial transverse perineus muscle
- 19 Left artery of bulb of penis
- 20 Perineal branch of pudendal nerve
- 21 Anus
- 22 External anal sphincter muscle
- 23 Gluteus maximus muscle
- 24 Obturator fascia with Alcock's canal for pudendal nerve, and internal pudendal artery and vein
- 25 Sacrotuberous ligament
- 26 Coccyx
- 27 Urogenital diaphragm with superficial investing fascia of perineum (perineal fascia)



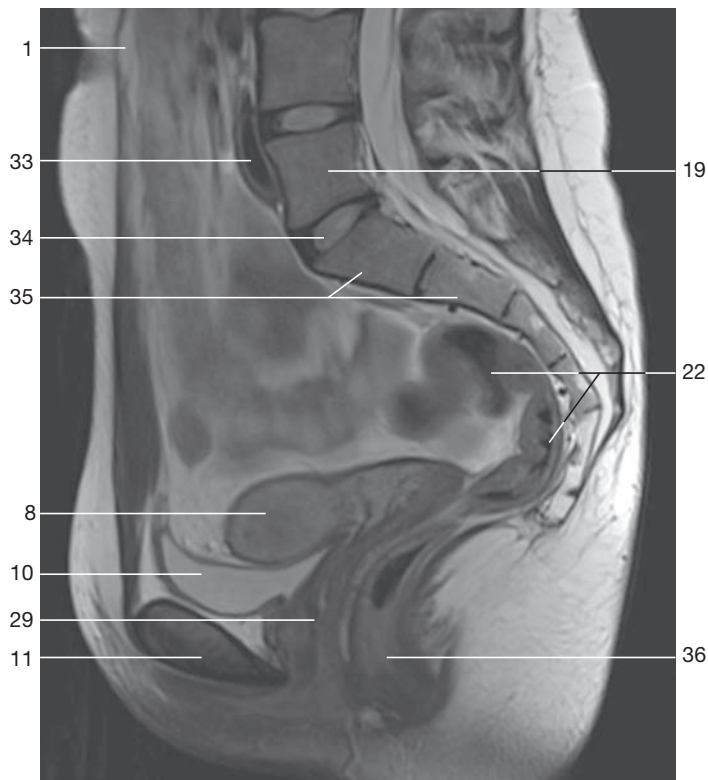
Urogenital diaphragm and external genital organs in the male (from below). The root of the penis has been cut. Dissection of the urogenital diaphragm.



Urogenital and anal regions in the male (from below). Muscles of urogenital and pelvic diaphragms. Light blue = perineal fascia.



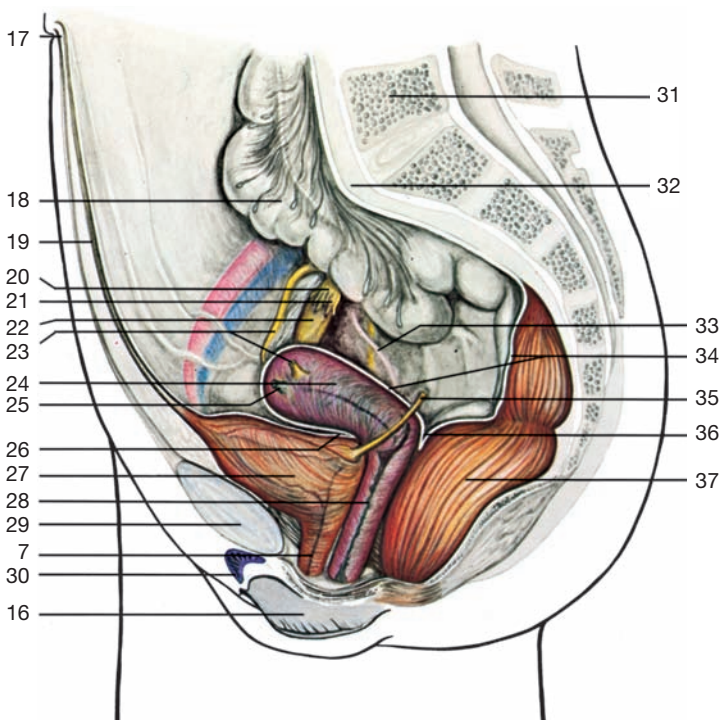
Female urogenital system (midsagittal section through the pelvic cavity). The urinary bladder is empty; the position and shape of the uterus are normal.



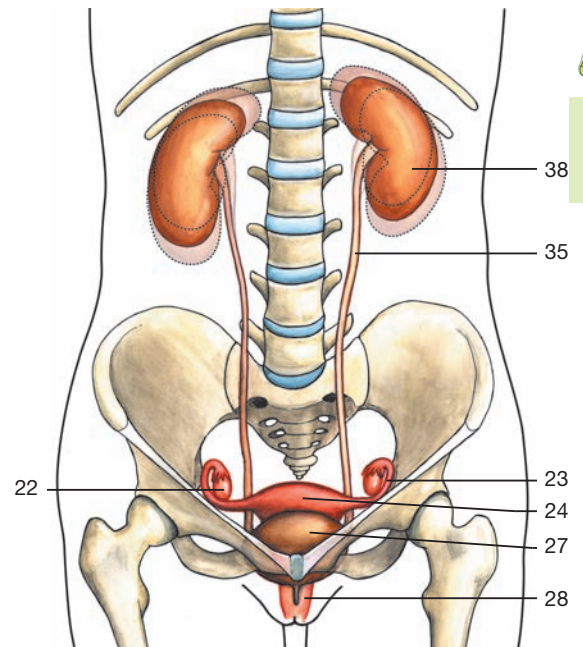
Sagittal section through the pelvic cavity of a young female. The uterus reveals an extreme anteversion (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



Coronal section through the urinary bladder and urethra in the female (anterior aspect).

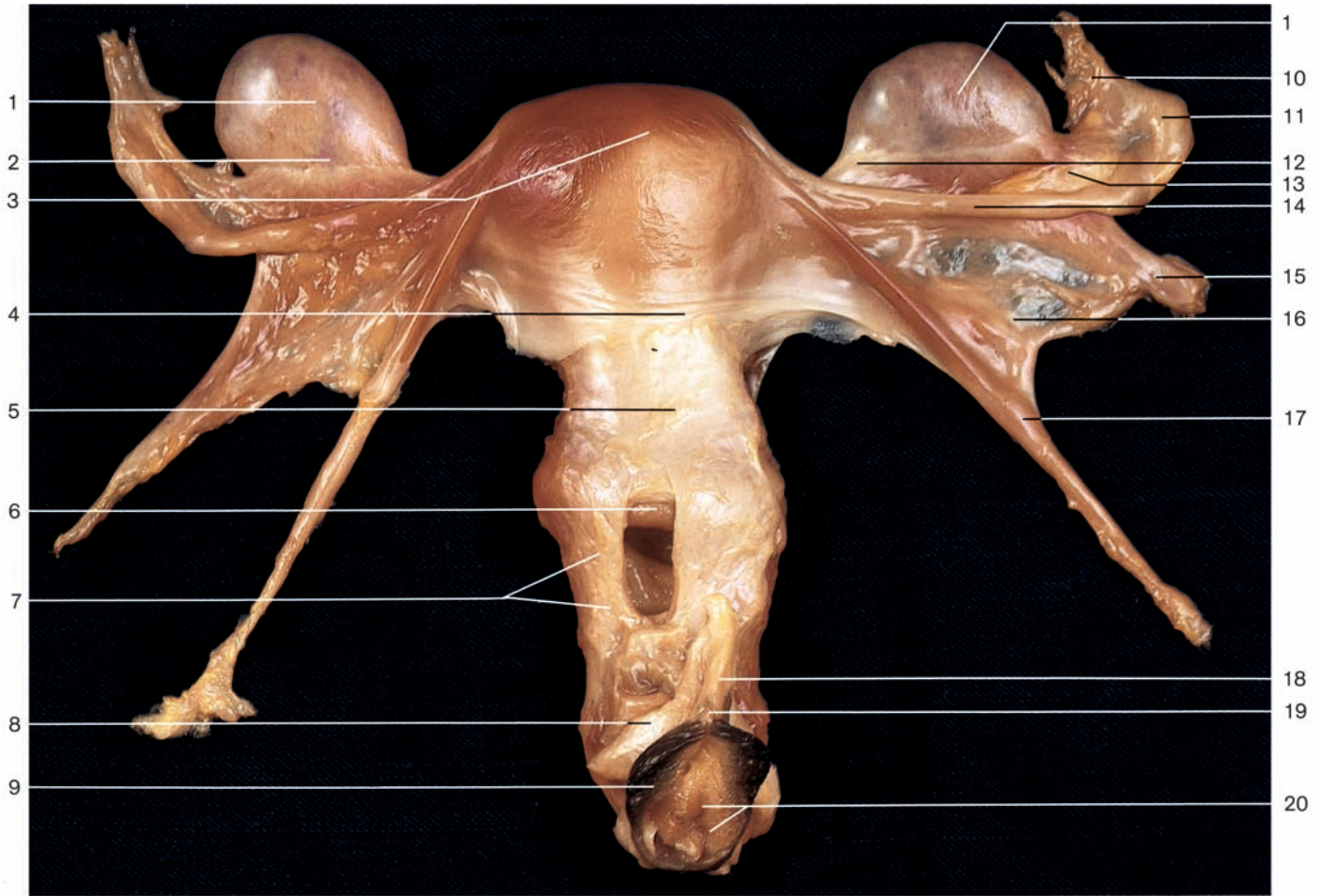


Position of female genital organs (medial aspect).

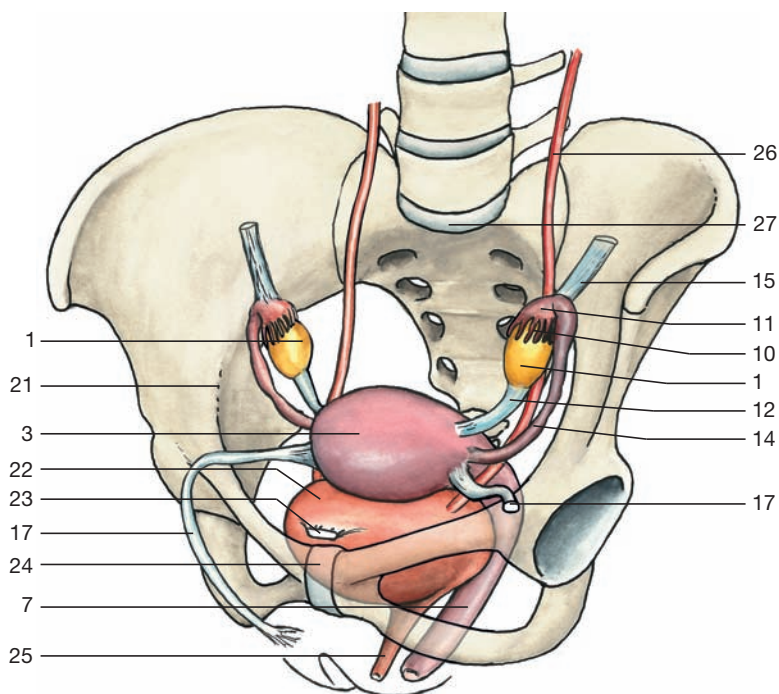


Position of kidneys, urinary, and genital organs in the female (anterior aspect). The excursions of the kidneys are indicated.

- 1 Muscular coat of urinary bladder
- 2 Folds of mucous membrane of urinary bladder
- 3 Right ureteric orifice
- 4 Interureteric fold
- 5 Internal urethral orifice
- 6 Vesico-uterine venous plexus
- 7 Urethra
- 8 Pubis (cut edge)
- 9 External urethral orifice
- 10 Vestibule of vagina
- 11 Left ureteric orifice
- 12 Trigone of bladder
- 13 Obturator internus muscle
- 14 Levator ani muscle
- 15 Bulb of vestibule
- 16 Left labium minus
- 17 Umbilicus
- 18 Sigmoid colon
- 19 Median umbilical fold with urachus
- 20 Infundibulum of uterine tube
- 21 Fimbriae of uterine tube
- 22 Ovary
- 23 Uterine tube (isthmus)
- 24 Uterus
- 25 Round ligament of uterus
- 26 Vesico-uterine pouch
- 27 Urinary bladder
- 28 Vagina
- 29 Pubic symphysis
- 30 Clitoris
- 31 Body of fifth lumbar vertebra (L₅)
- 32 Sacral promontory
- 33 Right ureter
- 34 Peritoneum (cut edge)
- 35 Left ureter
- 36 Recto-uterine pouch (of Douglas)
- 37 Rectal ampulla
- 38 Kidney

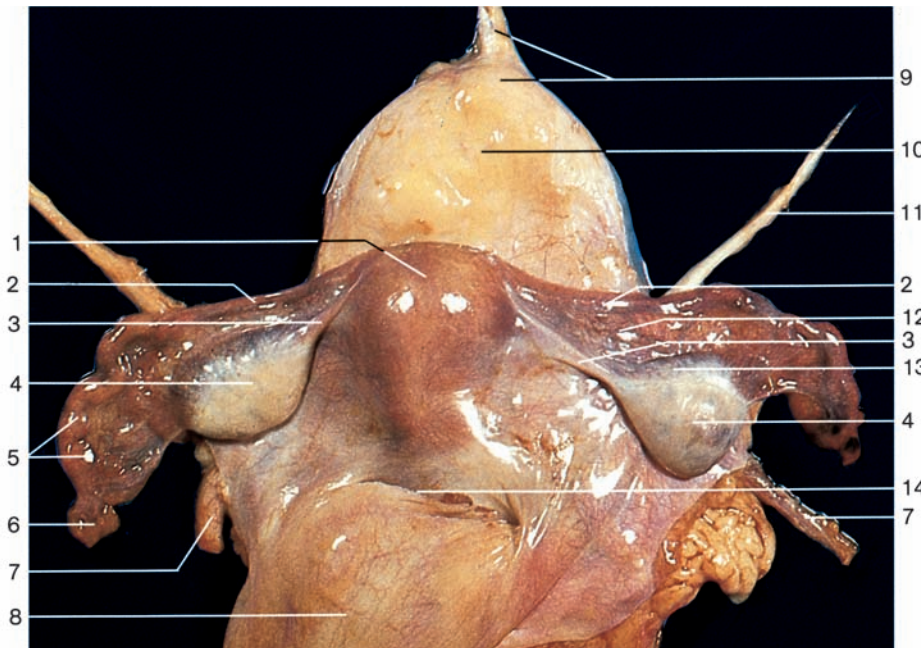


Female genital organs, isolated (anterior aspect). The anterior wall of the vagina has been opened to display the vaginal portion of the cervix.



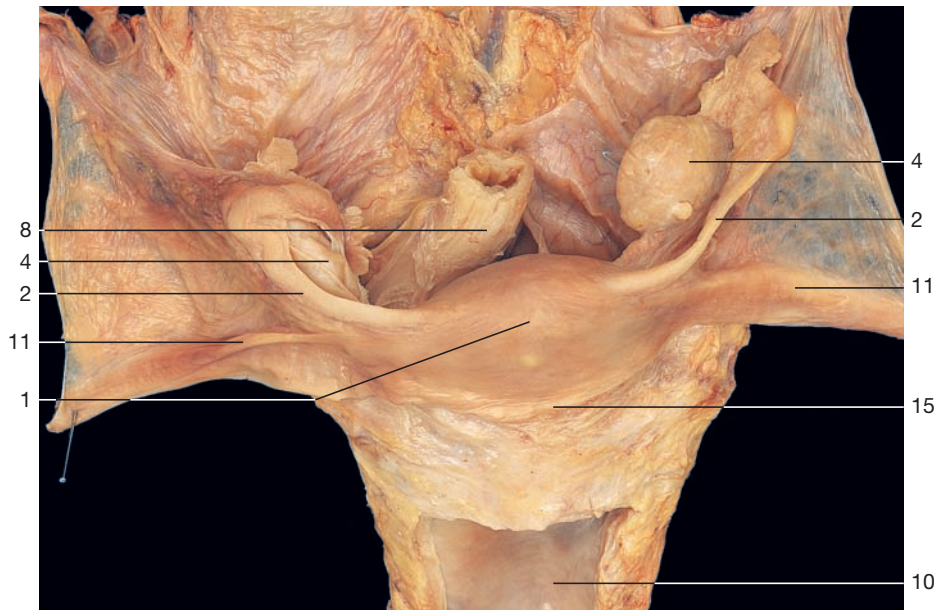
Position of female internal genital organs (oblique-anterior aspect).

- 1 Ovary
- 2 Mesovarium
- 3 Fundus of uterus
- 4 Vesico-uterine pouch
- 5 Cervix of uterus
- 6 Vaginal portion of cervix
- 7 Vagina
- 8 Crus of clitoris
- 9 Labium minus
- 10 Fimbriae of uterine tube
- 11 Infundibulum of uterine tube
- 12 Ligament of the ovary
- 13 Mesosalpinx
- 14 Uterine tube
- 15 Suspensory ligament of ovary (caudally displaced)
- 16 Broad ligament of uterus
- 17 Round ligament of uterus
- 18 Corpus cavernosum of clitoris
- 19 Glans of clitoris
- 20 Hymen and vaginal orifice
- 21 Linea terminalis
- 22 Urinary bladder
- 23 Medial umbilical ligament
- 24 Pubic symphysis
- 25 Urethra
- 26 Ureter
- 27 Promontory

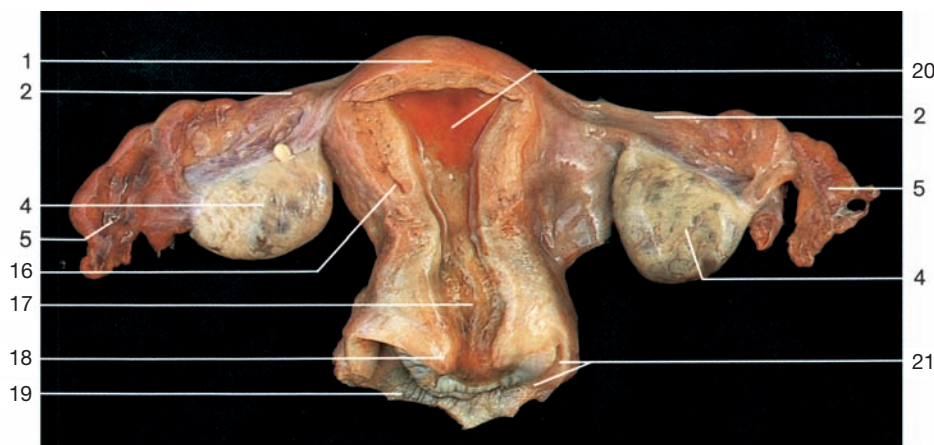


- 1 Fundus of uterus
- 2 Uterine tube
- 3 Ligament of the ovary
- 4 Ovary
- 5 Infundibulum of uterine tube
- 6 Fimbriae of uterine tube
- 7 Ureter
- 8 Rectum
- 9 Apex of urinary bladder and median umbilical ligament
- 10 Urinary bladder (fenestrated in the dissection in the middle)
- 11 Round ligament of uterus
- 12 Mesosalpinx
- 13 Mesovarium
- 14 Recto-uterine pouch (of Douglas)
- 15 Vesico-uterine pouch
- 16 Body of uterus
- 17 Cervix of uterus
- 18 Vaginal portion of cervix of uterus
- 19 Vagina
- 20 Mucous membrane of uterus congestion
- 21 Anterior fornix of vagina

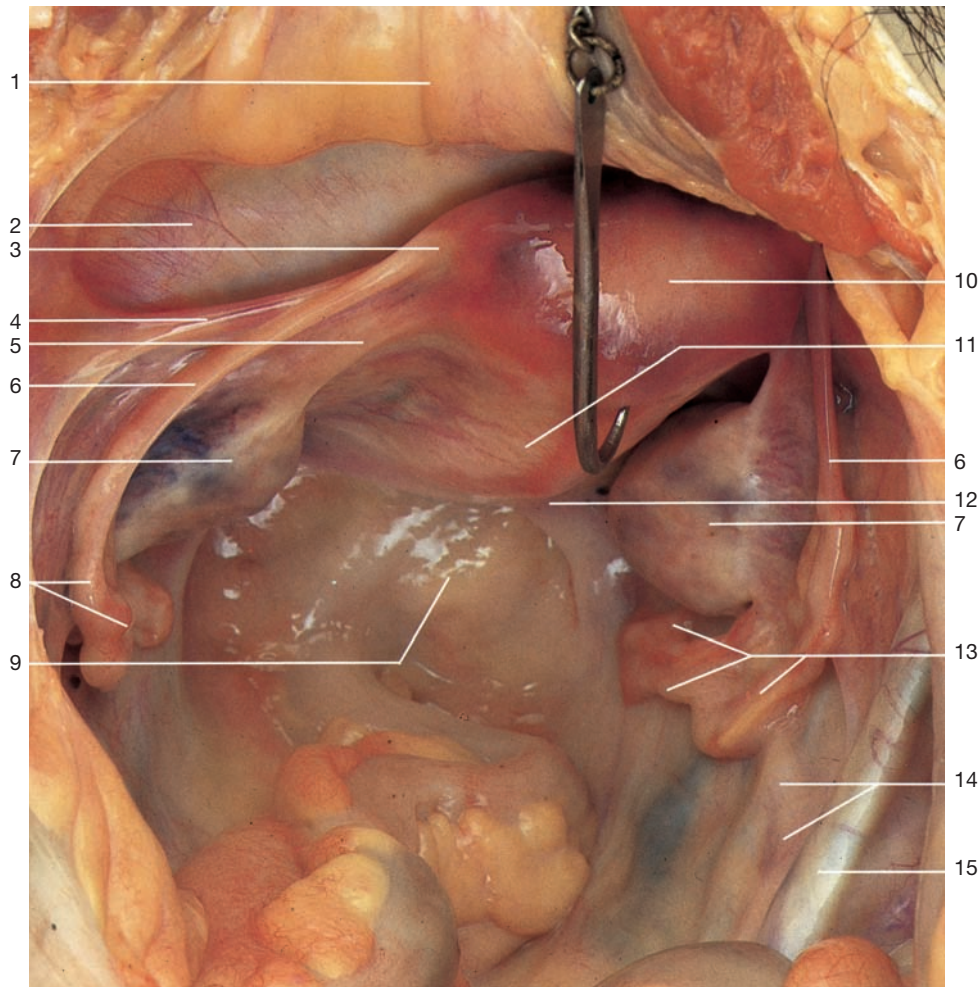
Female genital organs, isolated (supero-posterior aspect).



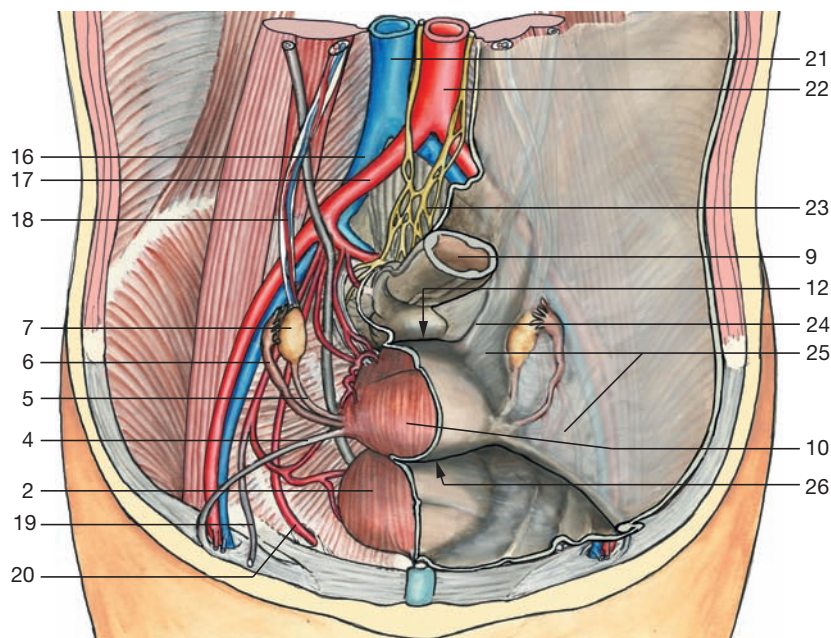
Uterus and related organs, isolated (superior aspect). The left ovary is enlarged.



Uterus and related organs, isolated (posterior aspect). The posterior wall of the uterus has been opened.



Female internal genital organs. View of the pelvic cavity (superior aspect). The uterus has been reflected to the right.



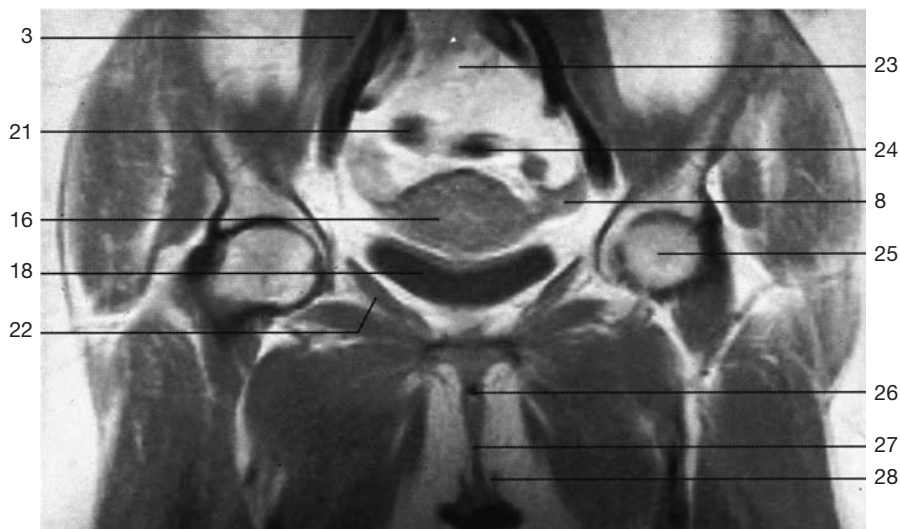
Pelvic cavity in the female showing uterus and related organs (antero-superior aspect). The peritoneal cover removed on the right side. Arrows: vesico-uterine and recto-uterine pouches.

- 1 Median umbilical fold with urachus
- 2 Urinary bladder
- 3 Insertion of uterine tube at fundus of uterus
- 4 Round ligament of uterus
- 5 Ligament of ovary
- 6 Uterine tube (isthmus)
- 7 Ovary
- 8 Ampulla of uterine tube
- 9 Rectum
- 10 Uterus
- 11 Vagina
- 12 Recto-uterine pouch (of Douglas)
- 13 Fimbriae of uterine tube
- 14 Suspensory ligament of ovary
- 15 Right common iliac artery (covered by peritoneum)
- 16 Common iliac vein
- 17 Common iliac artery
- 18 Ovarian artery and vein
- 19 Umbilical fold
- 20 Obturator artery
- 21 Inferior vena cava
- 22 Abdominal aorta
- 23 Superior hypogastric plexus
- 24 Recto-uterine fold
- 25 Broad ligament of uterus
- 26 Vesico-uterine pouch

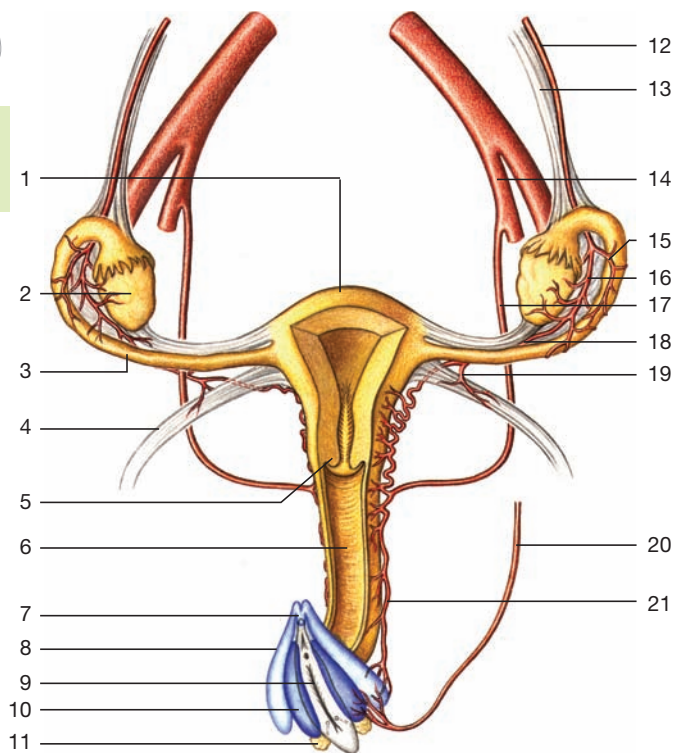


- 1 Ilio-inguinal nerve
- 2 Ureter
- 3 Psoas major muscle
- 4 Genitofemoral nerve
- 5 Common iliac vein
- 6 Common iliac artery
- 7 Ovary
- 8 Uterine tube
- 9 Peritoneum
- 10 Round ligament of uterus
- 11 Inferior vena cava
- 12 Abdominal aorta
- 13 Superior hypogastric plexus
- 14 Rectum
- 15 Recto-uterine pouch (of Douglas)
- 16 Uterus
- 17 Vesico-uterine pouch
- 18 Urinary bladder
- 19 Iliac crest
- 20 Pubic symphysis
- 21 Rectal ampulla
- 22 Obturator internus muscle
- 23 Promontorium
- 24 Sigmoid colon
- 25 Head of femur
- 26 Urethra
- 27 Vagina
- 28 Labium minus

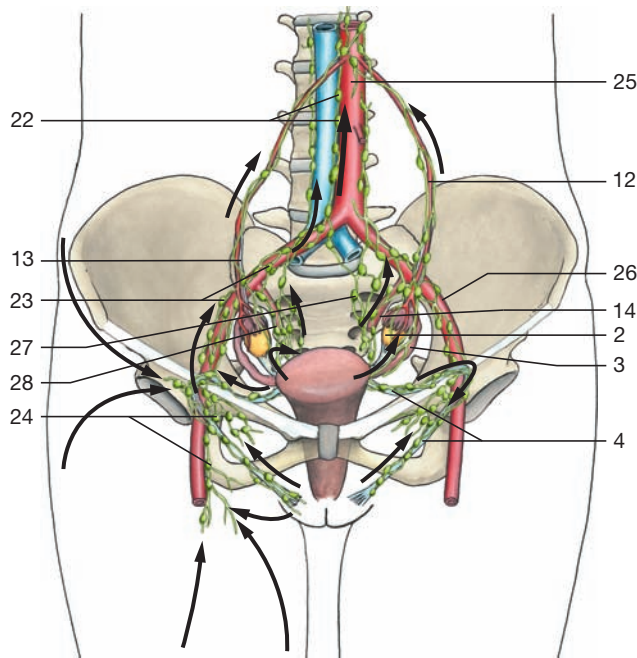
Pelvic cavity in the female showing uterus and related organs (superior aspect).
The peritoneum has been mostly removed.



Horizontal section through the pelvic cavity in the female (MRI scan).
(Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



Arteries of female genital organs.

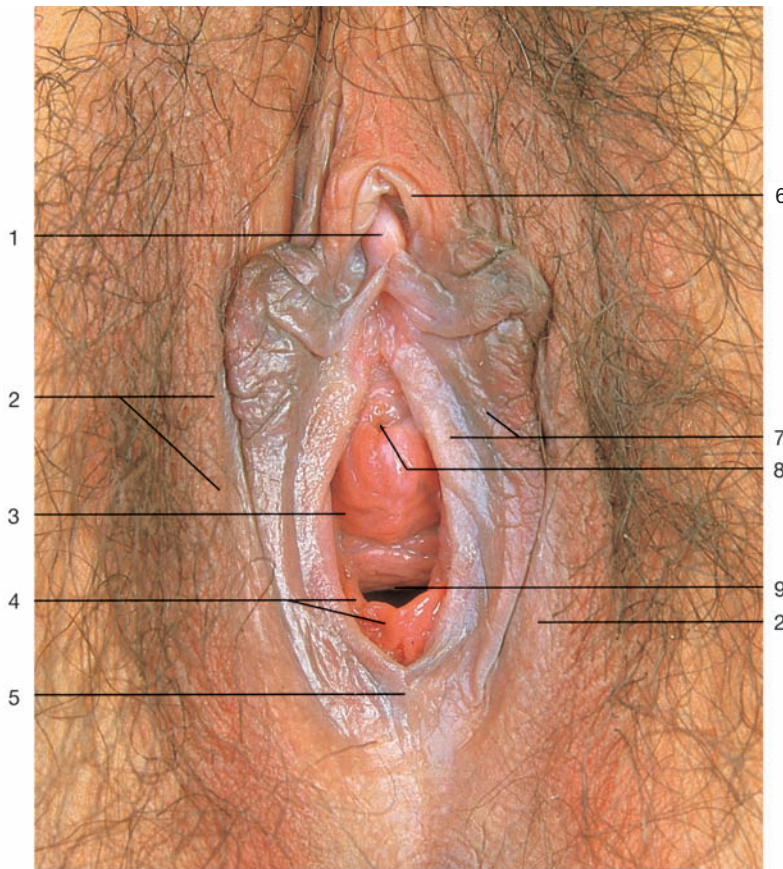


Main drainage routes of lymph vessels of uterus and related organs (indicated by arrows).

- | | | | |
|---------------------------------------|-------------------------------------|-------------------------------|-------------------------------|
| 1 Uterus | 10 Bulb of vestibule | 19 Artery of round ligament | 28 Internal iliac lymph nodes |
| 2 Ovary | 11 Greater vestibular gland | 20 Internal pudendal artery | 29 Superior gluteal artery |
| 3 Uterine tube | 12 Ovarian artery | 21 Vaginal artery | 30 Obturator artery |
| 4 Round ligament of uterus | 13 Suspensory ligament of ovary | 22 Lumbar lymph nodes | 31 Inferior gluteal artery |
| 5 Vaginal portion of cervix of uterus | 14 Internal iliac artery | 23 External iliac lymph nodes | 32 Middle sacral artery |
| 6 Vagina | 15 Tubal branch of ovarian artery | 24 Inguinal lymph nodes | 33 Femoral artery |
| 7 Clitoris | 16 Ovarian branch of ovarian artery | 25 Abdominal aorta | 34 Vessels of labium majus |
| 8 Corpus cavernosum of clitoris | 17 Uterine artery | 26 External iliac artery | 35 Femur |
| 9 Vaginal orifice | 18 Ovarian branch of uterine artery | 27 Sacral lymph nodes | |

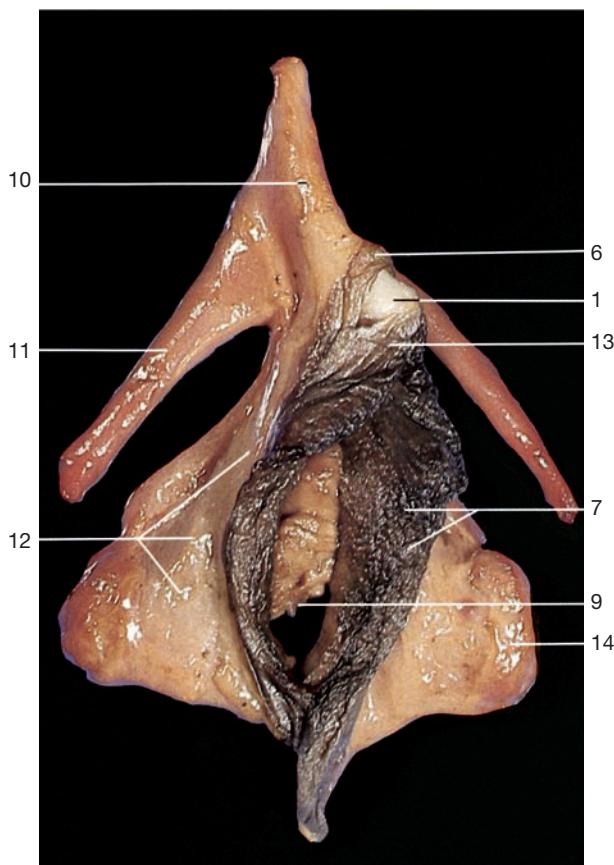


Arteriography of the pelvic vessels in the female (a.-p. direction).

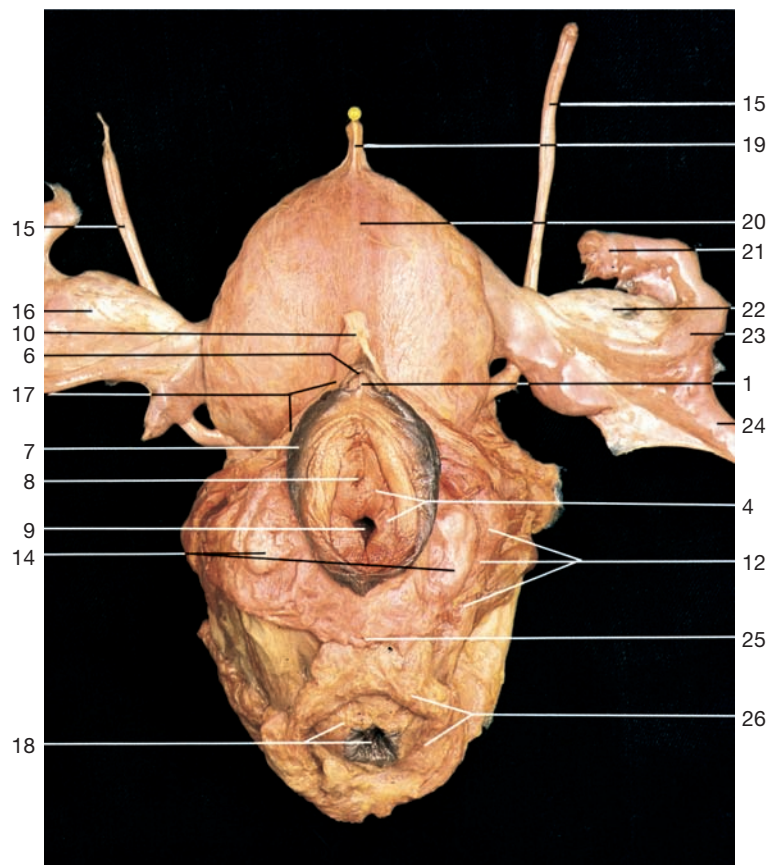


- 1 Glans of clitoris
- 2 Labium majus
- 3 Vestibule of vagina
- 4 Hymen
- 5 Posterior labial commissure
- 6 Prepuce of clitoris
- 7 Labium minus
- 8 External urethral orifice
- 9 Vaginal orifice
- 10 Body of clitoris
- 11 Crus of clitoris
- 12 Bulb of vestibule with bulbospongiosus muscle
- 13 Frenulum of clitoris
- 14 Greater vestibular gland
- 15 Ureter
- 16 Adnexa of uterus
- 17 Cavernous body of clitoris
- 18 Anus and internal anal sphincter
- 19 Urachus
- 20 Urinary bladder
- 21 Infundibulum of uterine tube
- 22 Ovary
- 23 Uterine tube
- 24 Suspensory ligament of ovary
- 25 Perineal body
- 26 External anal sphincter

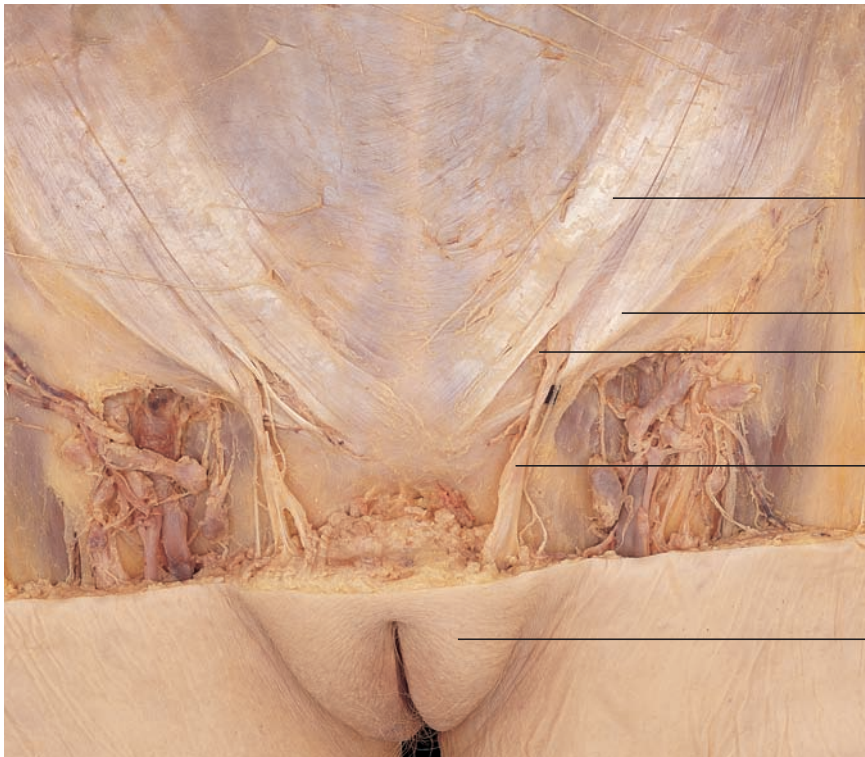
Female external genital organs in situ (anterior aspect). Labia reflected.



Cavernous tissue of female external genital organs, isolated (anterior aspect).

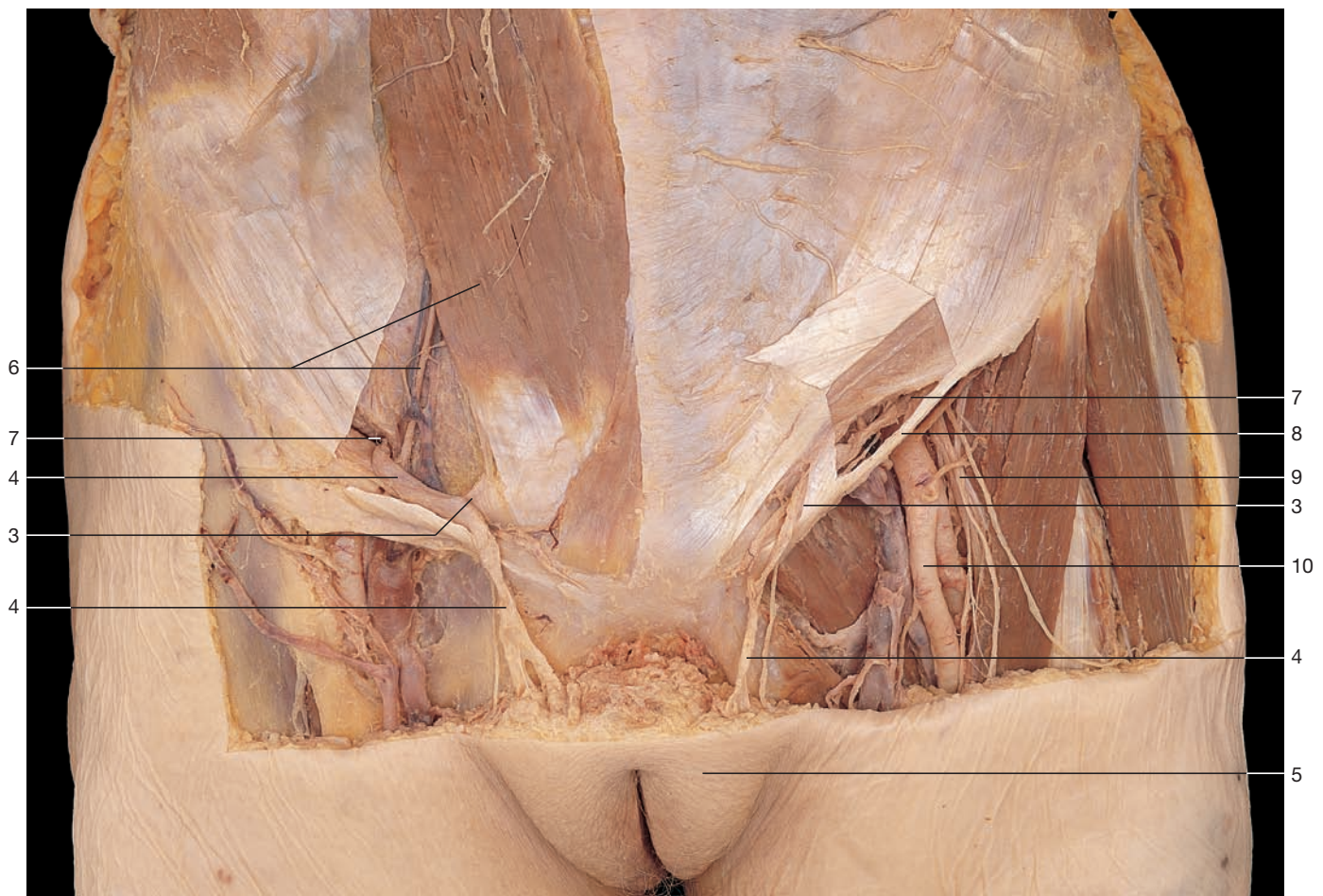


Female external genital organs in relation to internal genital organs and urinary system, isolated (anterior aspect).



- 1 Medial crus of superficial inguinal ring
- 2 Lateral crus of superficial inguinal ring
- 3 Superficial inguinal ring
- 4 Round ligament of uterus
- 5 Outer labia (labium majus)
- 6 Rectus abdominis muscle and inferior epigastric artery
- 7 Deep inguinal ring with ilio-inguinal nerve
- 8 Inguinal ligament
- 9 Femoral nerve
- 10 Femoral artery

Inguinal region and external genital organs in the female (anterior aspect).
Dissection of the inguinal canal and round ligament of uterus of a child.

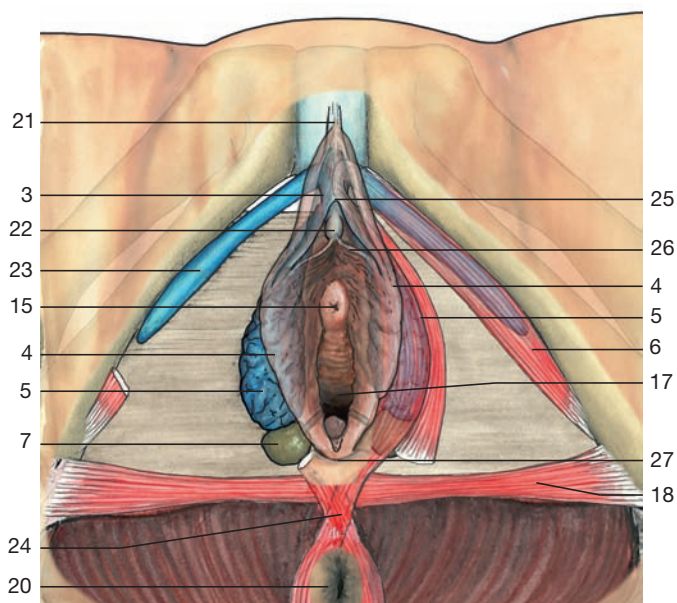


Inguinal region and external genital organs in the female (anterior aspect). The inguinal canal has been opened. The round ligament of uterus and the ilio-inguinal nerve have been dissected.

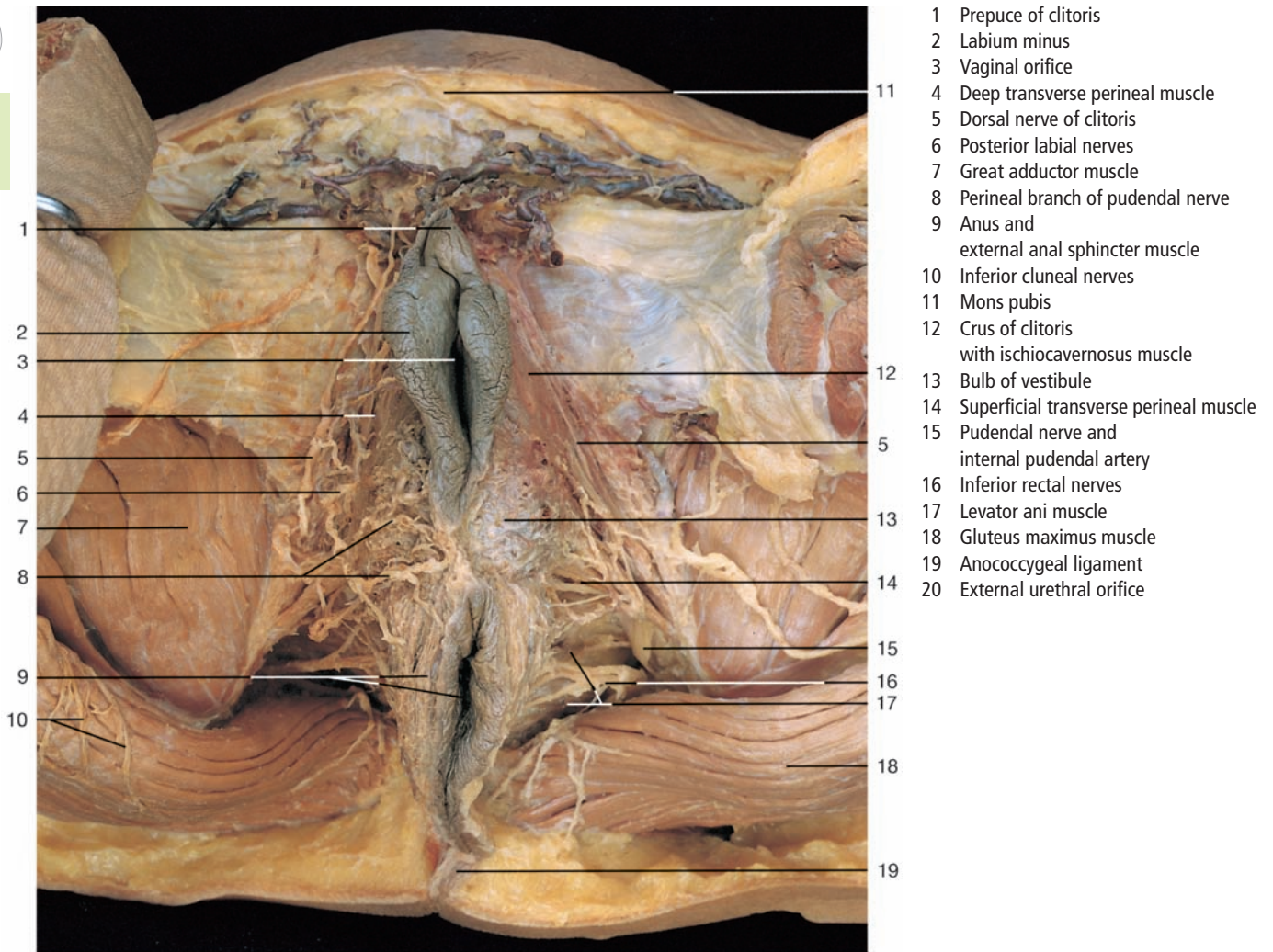


- 1 Fatty tissue encasing round ligament of uterus
- 2 Position of pubic symphysis
- 3 Clitoris
- 4 Labium minus
- 5 Bulb of vestibule
- 6 Ischiocavernosus muscle
- 7 Greater vestibular gland
- 8 Perineal branches of pudendal nerve
- 9 Levator ani muscle
- 10 Inferior rectal nerves
- 11 External anal sphincter muscle
- 12 Gluteus maximus muscle
- 13 Coccyx
- 14 Fatty tissue of mons pubis
- 15 External orifice of urethra
- 16 Urogenital diaphragm with fascia of deep transverse perineal muscle
- 17 Vaginal orifice
- 18 Superficial transverse perineal muscle
- 19 Obturator internus muscle
- 20 Anus
- 21 Suspensory ligament of clitoris
- 22 Glans of clitoris
- 23 Crus of clitoris
- 24 Perineal body
- 25 Prepuce of clitoris
- 26 Frenulum of clitoris
- 27 Posterior commissure of labia

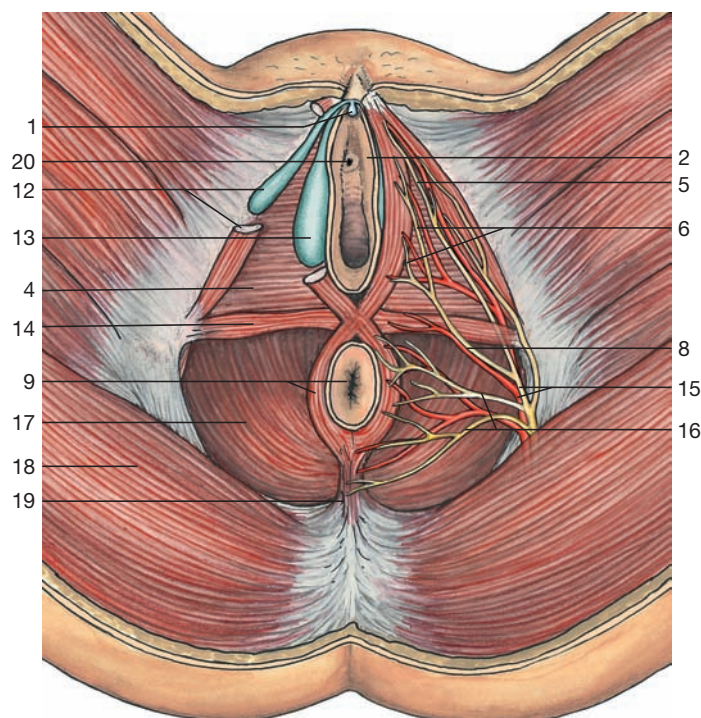
External genital organs and urogenital diaphragm in the female, superficial layer (inferior aspect).



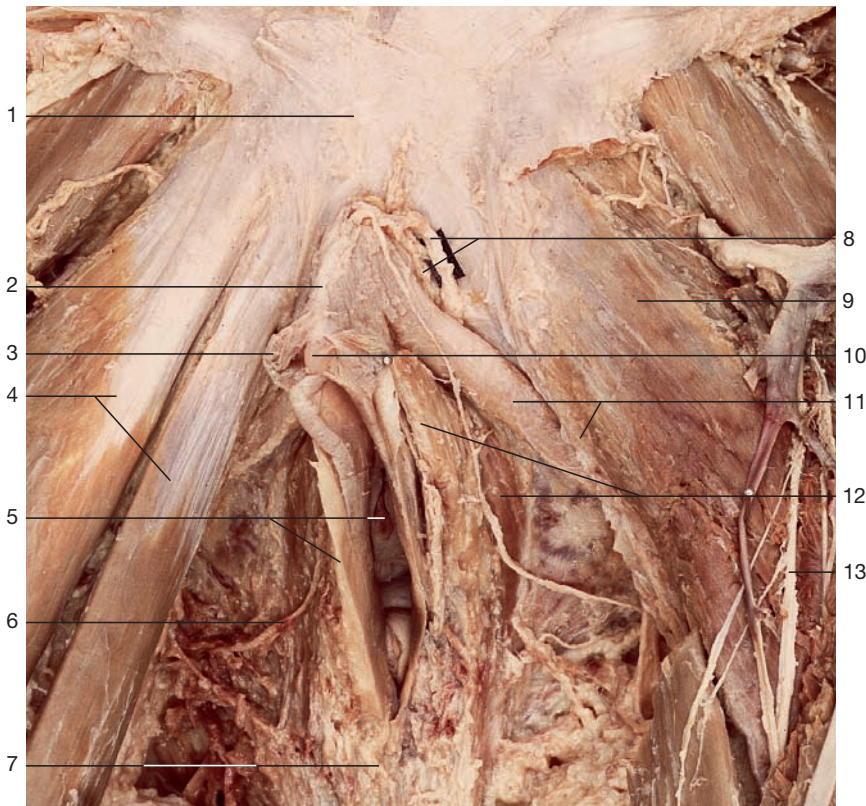
External genital organs with cavernous tissue in the female (inferior aspect). Blue = cavernous tissue of clitoris and bulb of vestibule.



External genital organs and urogenital diaphragm in the female, superficial layer (inferior aspect). On the right side the bulb of vestibule has been removed.



Urogenital and pelvic diaphragms in the female (inferior aspect). Muscles, nerves, and arteries have been displayed. The bulb of vestibule has been partly removed.



- 1 Position of pubic symphysis
- 2 Body of clitoris
- 3 Prepuce of clitoris
- 4 Adductor longus and gracilis muscles
- 5 External orifice of vagina and labium minus
- 6 Posterior labial nerve
- 7 Perineal body
- 8 Deep artery of clitoris and dorsal nerve of clitoris
- 9 Adductor brevis muscle
- 10 Glans of clitoris
- 11 Crus of clitoris and ischiocavernosus muscle
- 12 Bulb of vestibule and bulbospongiosus muscle
- 13 Anterior branch of obturator nerve

External genital organs in the female (anterior aspect). The clitoris has been dissected and slightly reflected to the right. The prepuce of clitoris has been divided to display the glans.



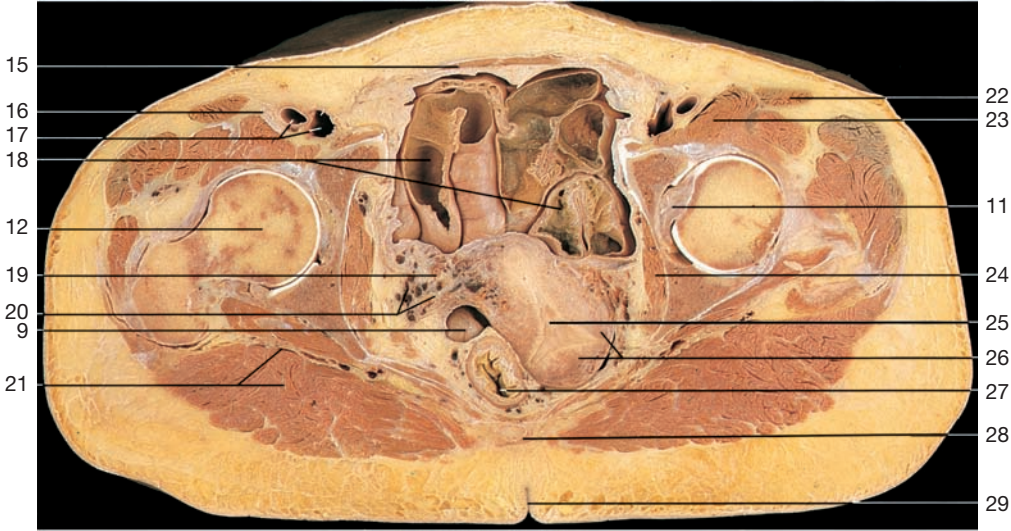
- 1 Clitoris
- 2 Labium minus
- 3 Vaginal orifice
- 4 Posterior labial nerves
- 5 Perineal branches of pudendal nerve
- 6 External anal sphincter muscle
- 7 Anus
- 8 Crus of clitoris and ischiocavernosus muscle
- 9 Bulb of vestibule
- 10 Dorsal artery of clitoris
- 11 Superficial transverse perineal muscle
- 12 Perineal branch of posterior femoral cutaneous nerve
- 13 Levator ani muscle
- 14 Internal pudendal artery
- 15 Inferior rectal nerves
- 16 Gluteus maximus muscle
- 17 Anococcygeal ligament

External genital organs and urogenital diaphragm in the female (latero-inferior aspect). The bulb of vestibule has been partly removed. The left labium minus was cut away.

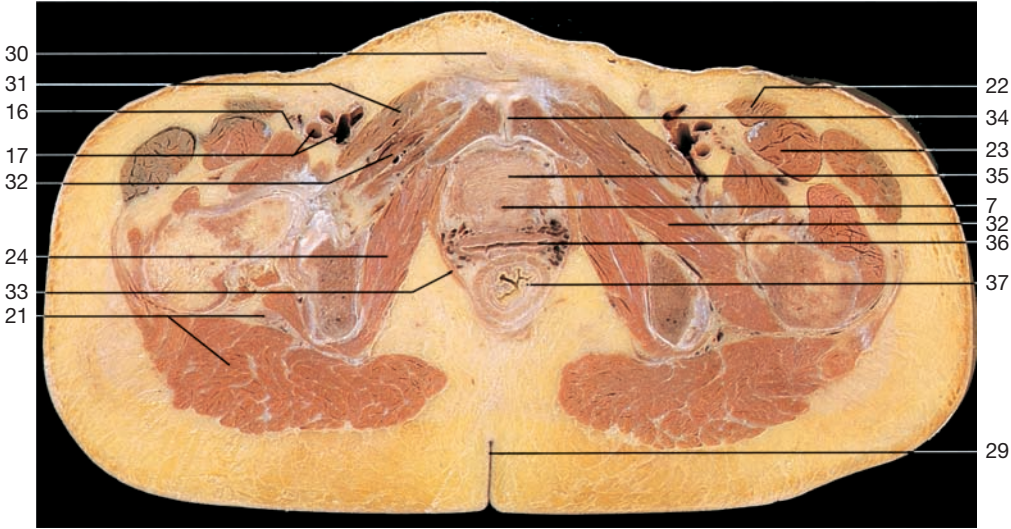


Coronal section through the pelvic cavity of the female at the level of the hip joints.

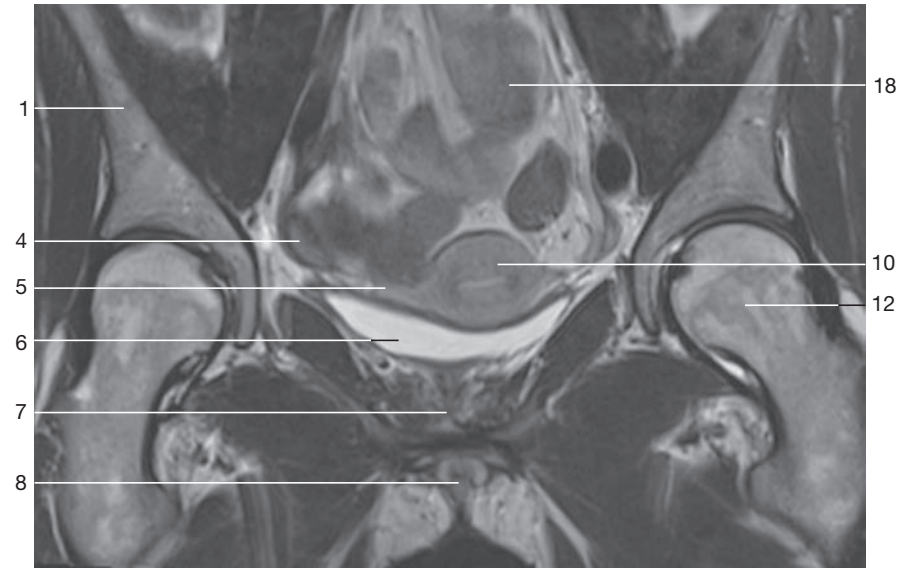
- 1 Ilium
- 2 Rectum
- 3 Recto-uterine fold
- 4 Ovary
- 5 Uterine tube
- 6 Urinary bladder
- 7 Urethra
- 8 Labium minus
- 9 Recto-uterine pouch
- 10 Uterus and vesico-uterine pouch
- 11 Ligament of the head of femur
- 12 Head of femur
- 13 Vestibule of vagina
- 14 Labium majus
- 15 Pyramidalis muscle
- 16 Femoral nerve
- 17 Femoral artery and vein
- 18 Small intestine
- 19 Broad ligament of uterus



Horizontal section through the pelvic cavity of the female at the level of the uterus (inferior aspect). The uterus is retroverted to the left.

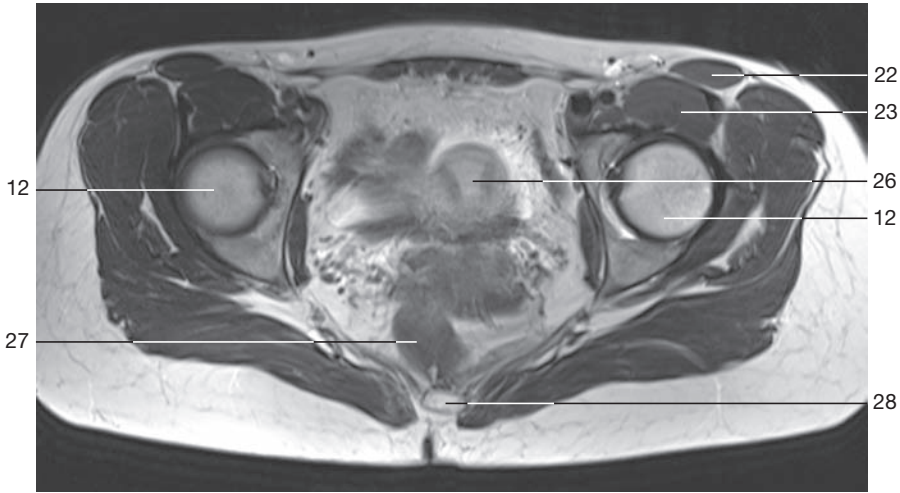


Horizontal section through the pelvic cavity of the female at the level of the urethral sphincter muscle and vagina (inferior aspect).

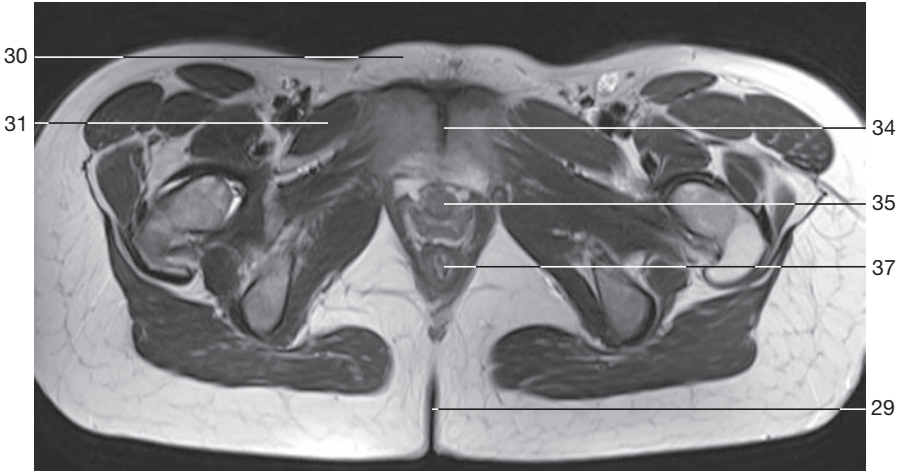


- 20 Uterine venous plexus
- 21 Sciatic nerve and gluteus maximus muscle
- 22 Sartorius muscle
- 23 Iliopsoas muscle
- 24 Obturator internus muscle
- 25 Endometrium
- 26 Myometrium
- 27 Rectal ampulla
- 28 Coccyx
- 29 Anal cleft
- 30 Mons pubis
- 31 Pectineus muscle
- 32 Obturator externus muscle
- 33 Levator ani muscle
- 34 Pubic symphysis
- 35 Urethral sphincter muscle (base of urinary bladder)
- 36 Vagina
- 37 Rectum (anal canal)

Coronal section through the pelvic cavity of the female at the level of the hip joints (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



Horizontal section through the pelvic cavity of the female at the level of the uterus (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)

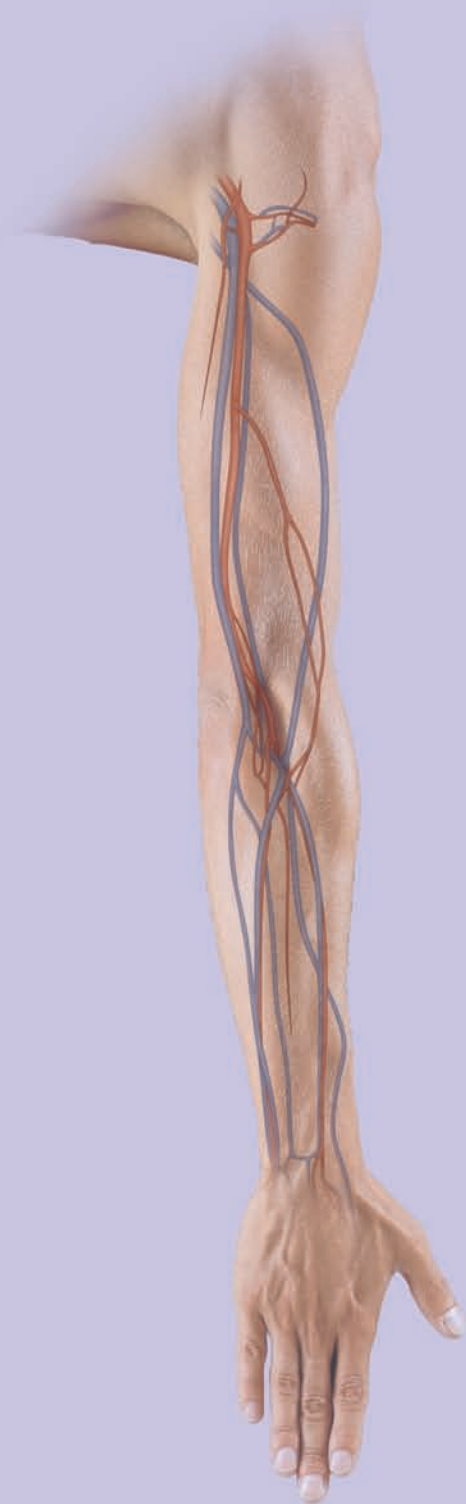


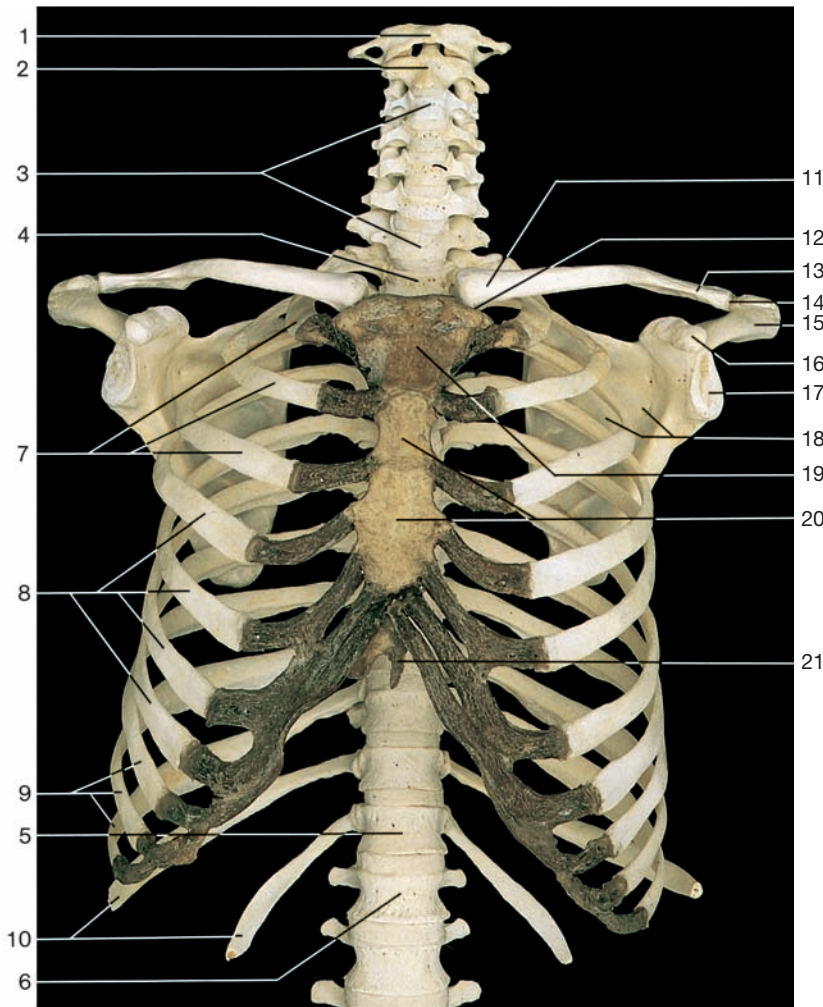
Horizontal section through the pelvic cavity of the female at the level of urethral sphincter muscle and vagina (MRI scan). (Prof. Uder, Dept. of Radiology, Univ. Erlangen-Nuremberg, Germany.)



7 Upper Limb

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**Vertebral column**

- 1 Atlas (C_1)
- 2 Axis (C_2)
- 3 Third to seventh cervical vertebrae (C_3 – C_7)
- 4 First thoracic vertebra (Th_1)
- 5 Twelfth thoracic vertebra (Th_{12})
- 6 First lumbar vertebra (L_1)

Ribs

- | | |
|--|--------------|
| 7 First to third ribs | } True ribs |
| 8 Fourth to seventh ribs | |
| 9 Eighth to tenth ribs | } False ribs |
| 10 Eleventh and twelfth ribs (floating ribs) | |

Clavicle (A)

- 11 Sternal end
- 12 Sternoclavicular joint
- 13 Acromial end
- 14 Acromioclavicular joint

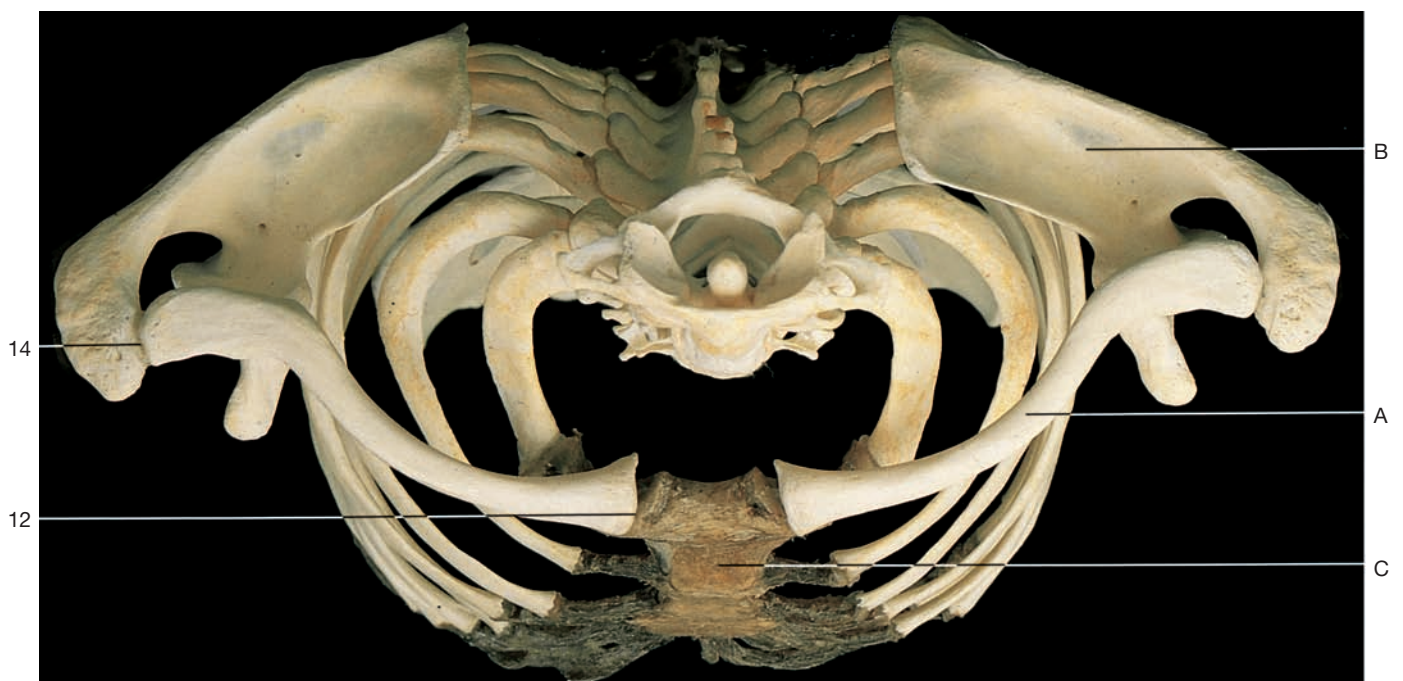
Scapula (B)

- 15 Acromion
- 16 Coracoid process
- 17 Glenoid cavity
- 18 Costal surface

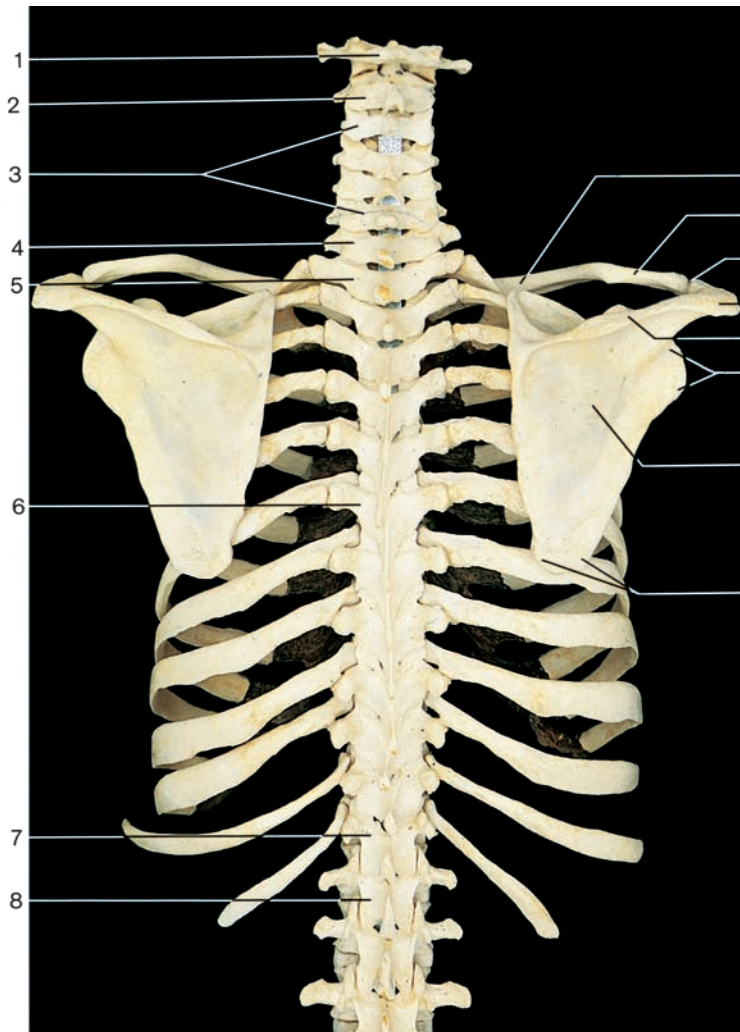
Sternum (C)

- 19 Manubrium
- 20 Body
- 21 Xiphoid process

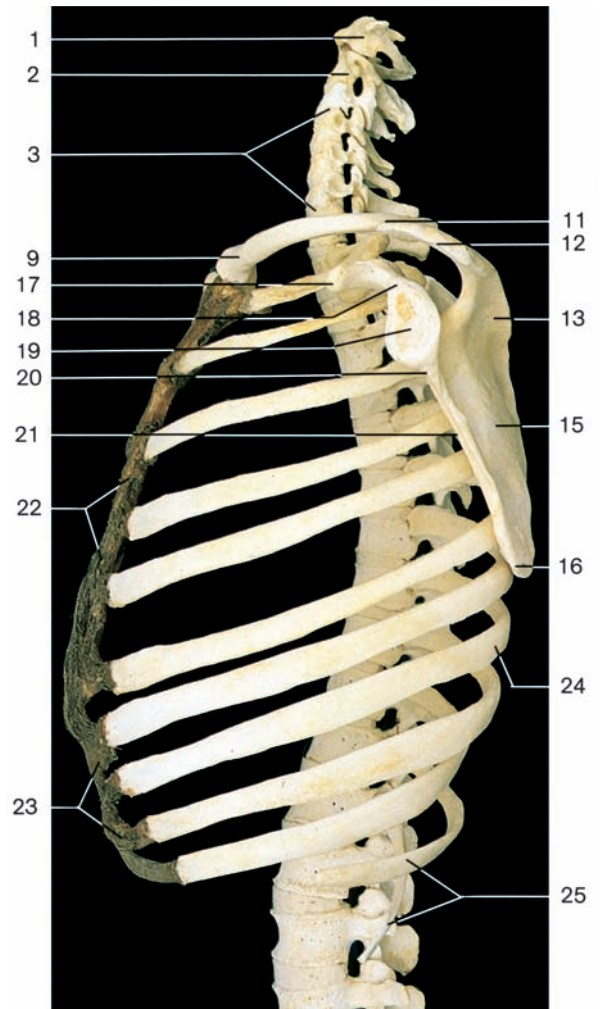
Skeleton of shoulder girdle and thorax (anterior aspect).
The cartilaginous parts of the ribs appear dark brown.



Skeleton of shoulder girdle and thorax (superior aspect).



Skeleton of shoulder girdle and thorax (posterior aspect).



Skeleton of shoulder girdle and thorax (lateral aspect).

Vertebral column

- 1 Atlas
- 2 Axis
- 3 Third to sixth cervical vertebrae
- 4 Seventh vertebra (vertebra prominens)
- 5 First thoracic vertebra
- 6 Sixth thoracic vertebra
- 7 Twelfth thoracic vertebra
- 8 First lumbar vertebra

Clavicle

- 9 Sternal end
- 10 Acromial end
- 11 Acromioclavicular joint

Scapula

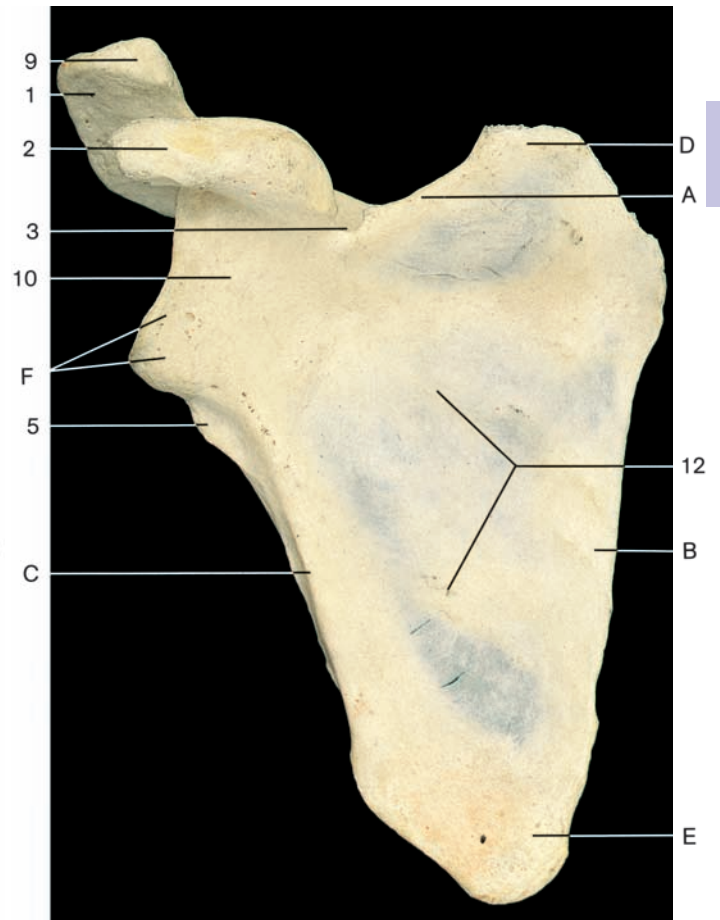
- 12 Acromion
- 13 Spine of scapula
- 14 Lateral angle
- 15 Posterior surface
- 16 Inferior angle
- 17 Coracoid process
- 18 Supraglenoid tubercle
- 19 Glenoid cavity
- 20 Infraglenoid tubercle
- 21 Lateral margin

Thorax

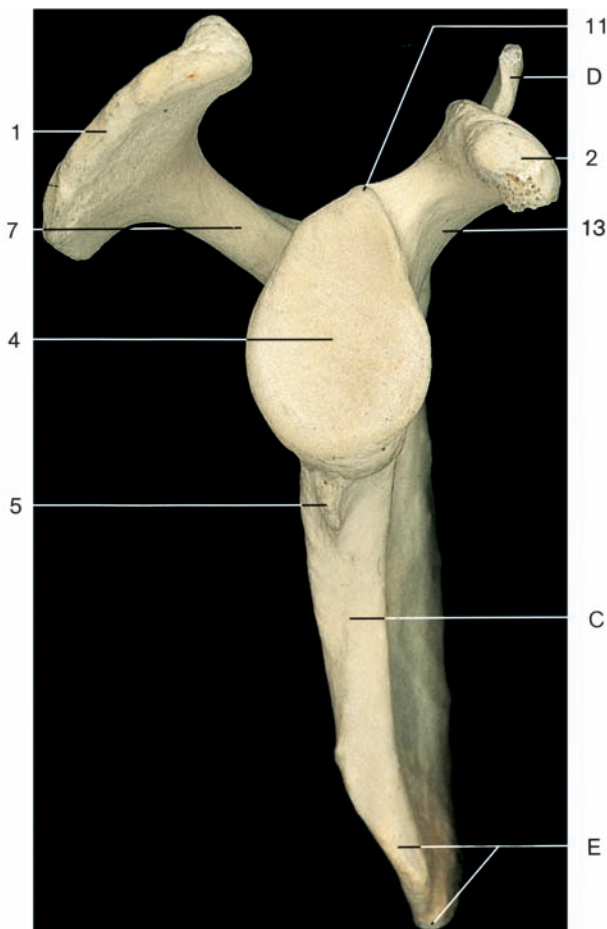
- 22 Body of sternum
- 23 Subcostal angle
- 24 Angle of rib
- 25 Floating ribs



Right scapula (posterior aspect).



Right scapula (anterior aspect, costal surface).



Right scapula (lateral aspect).



Right clavicle (superior aspect).



Right clavicle (inferior aspect).

Scapula

- A = Superior border
B = Medial border
C = Lateral border
D = Superior angle
E = Inferior angle
F = Lateral angle

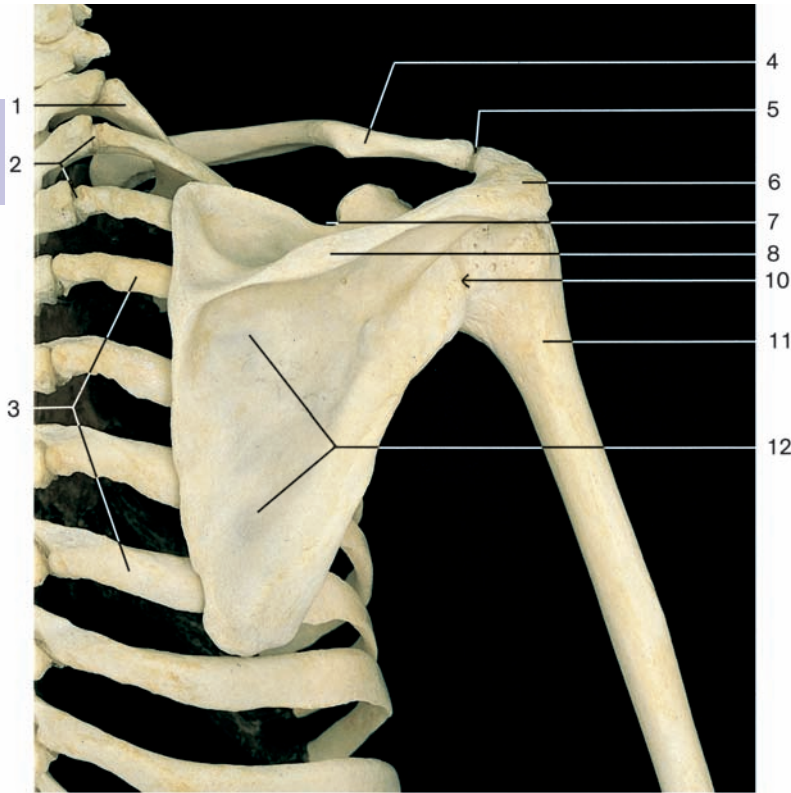
- 1 Acromion
2 Coracoid process
3 Scapular notch
4 Glenoid cavity
5 Infraglenoid tubercle
6 Supraspinous fossa
7 Spine

- 8 Infraspinous fossa

- 9 Articular facet for the acromion
10 Neck
11 Supraglenoid tubercle
12 Costal (anterior) surface
13 Base of coracoid process

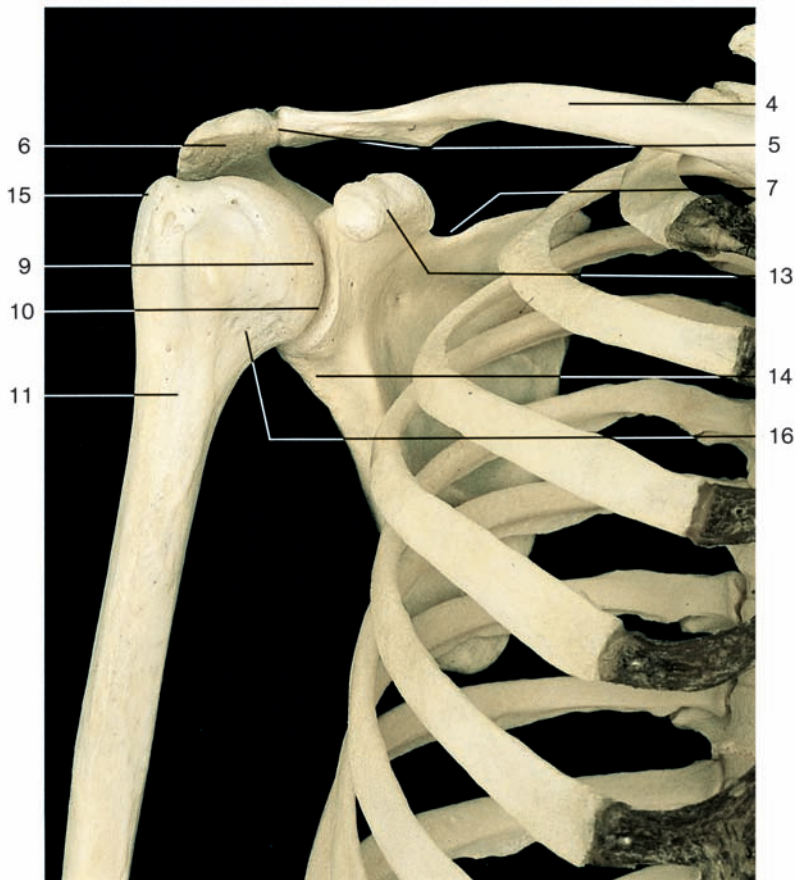
Clavicle

- 1 Acromial end
2 Articular facet for the acromion
3 Articular facet for the sternum
4 Sternal end
5 Trapezoid line
6 Conoid tubercle
7 Impression of costoclavicular ligament

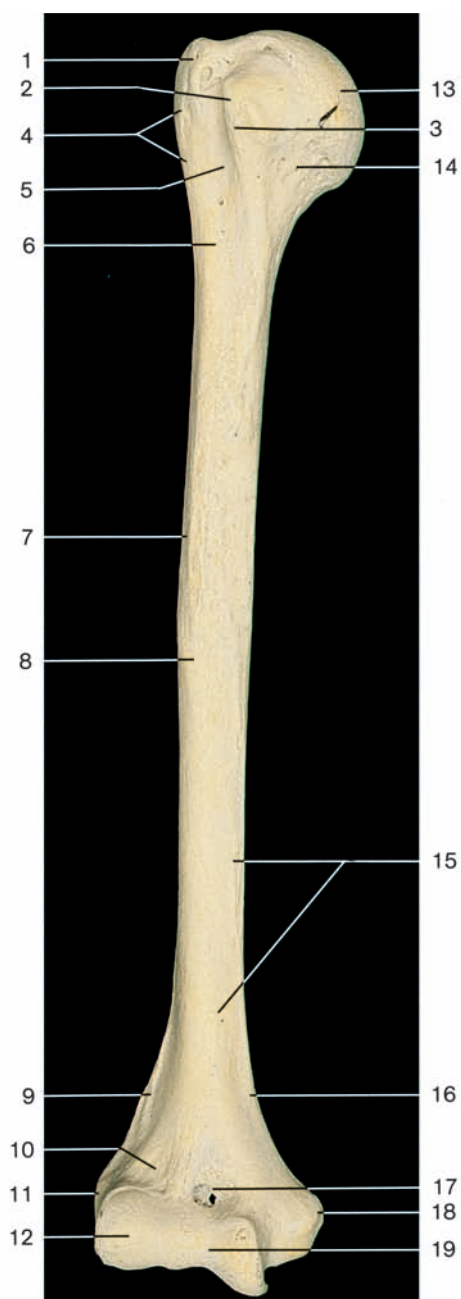


- 1 First rib
- 2 Position of costotransverse joints
- 3 Fourth to seventh ribs
- 4 Clavicle
- 5 Position of acromioclavicular joint
- 6 Acromion
- 7 Scapular notch
- 8 Spine of scapula
- 9 Head of humerus
- 10 Glenoid cavity
- 11 Surgical neck of humerus
- 12 Posterior surface of scapula
- 13 Coracoid process
- 14 Infraglenoid tubercle
- 15 Greater tubercle of humerus
- 16 Anatomical neck of humerus

Bones of shoulder joint (posterior aspect).



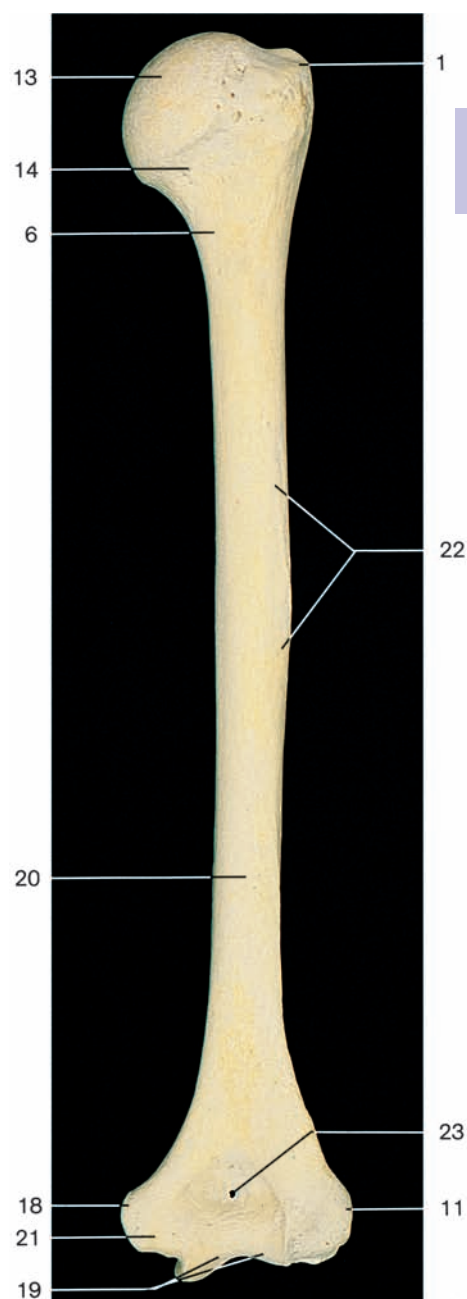
Bones of shoulder joint (anterior aspect).



Right humerus (anterior aspect).



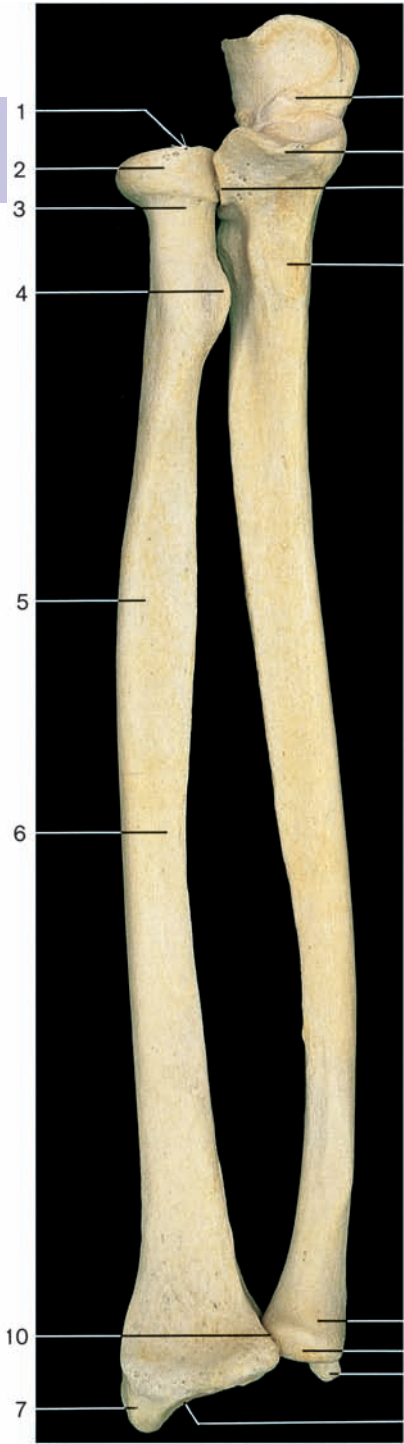
Right humerus (medial aspect).



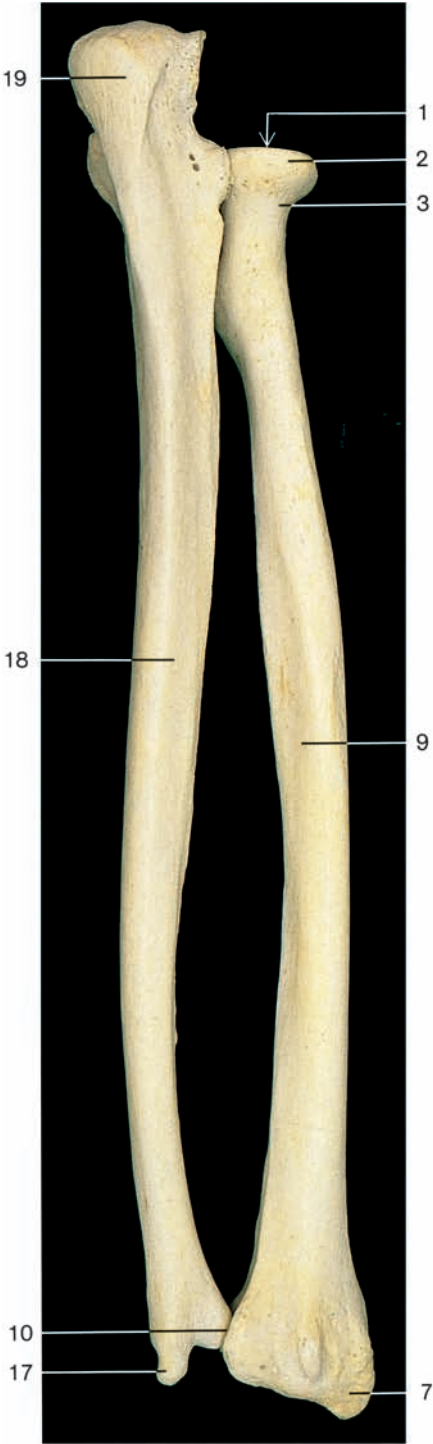
Right humerus (posterior aspect).

Humerus

- | | | | |
|-----------------------------|-------------------------------|-------------------------------|----------------------------|
| 1 Greater tubercle | 7 Deltoid tuberosity | 13 Head | 19 Trochlea |
| 2 Lesser tubercle | 8 Antero-lateral surface | 14 Anatomical neck | 20 Posterior surface |
| 3 Crest of lesser tubercle | 9 Lateral supracondylar ridge | 15 Antero-medial surface | 21 Groove for ulnar nerve |
| 4 Crest of greater tubercle | 10 Radial fossa | 16 Medial supracondylar ridge | 22 Groove for radial nerve |
| 5 Intertubercular sulcus | 11 Lateral epicondyle | 17 Coronoid fossa | 23 Olecranon fossa |
| 6 Surgical neck | 12 Capitulum | 18 Medial epicondyle | |



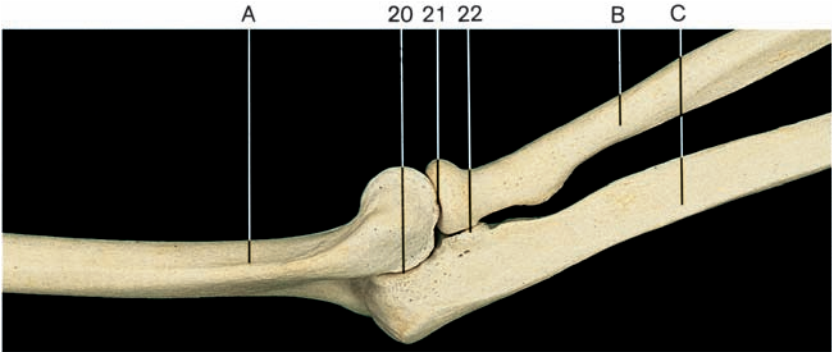
Bones of right forearm, radius, and ulna (anterior aspect).



Bones of right forearm, radius, and ulna (posterior aspect).

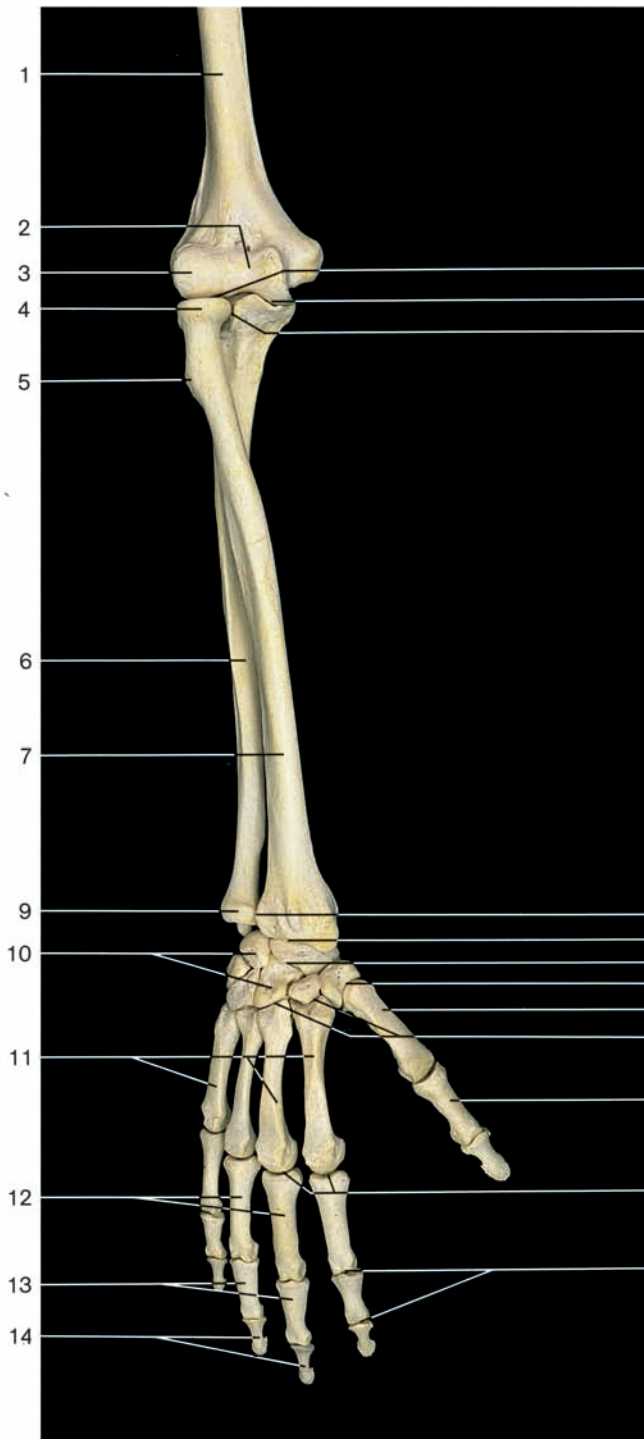
- Radius**
- 1 Head
 - 2 Articular circumference
 - 3 Neck
 - 4 Radial tuberosity
 - 5 Shaft
 - 6 Anterior surface
 - 7 Styloid process
 - 8 Articular surface
 - 9 Posterior surface
 - 10 Ulnar notch

- Ulna**
- 11 Trochlear notch
 - 12 Coronoid process
 - 13 Radial notch
 - 14 Ulnar tuberosity
 - 15 Head
 - 16 Articular circumference
 - 17 Styloid process
 - 18 Posterior surface
 - 19 Olecranon

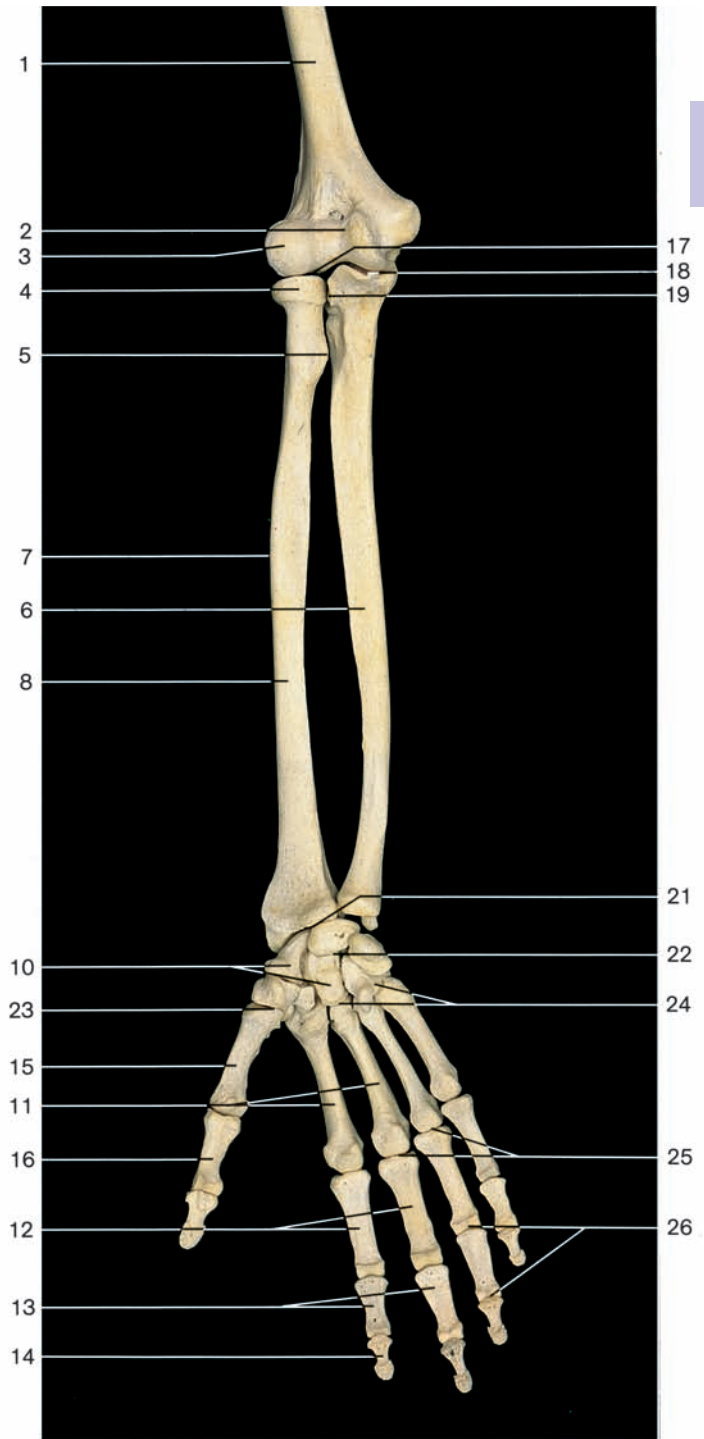


Bones of the right elbow joint (lateral aspect).

- Articulations at the right elbow**
- 20 Site of humero-ulnar joint
 - 21 Site of humeroradial joint
 - 22 Site of proximal radio-ulnar joint
- A = Humerus
B = Radius
C = Ulna



Skeleton of right forearm and hand in pronation.

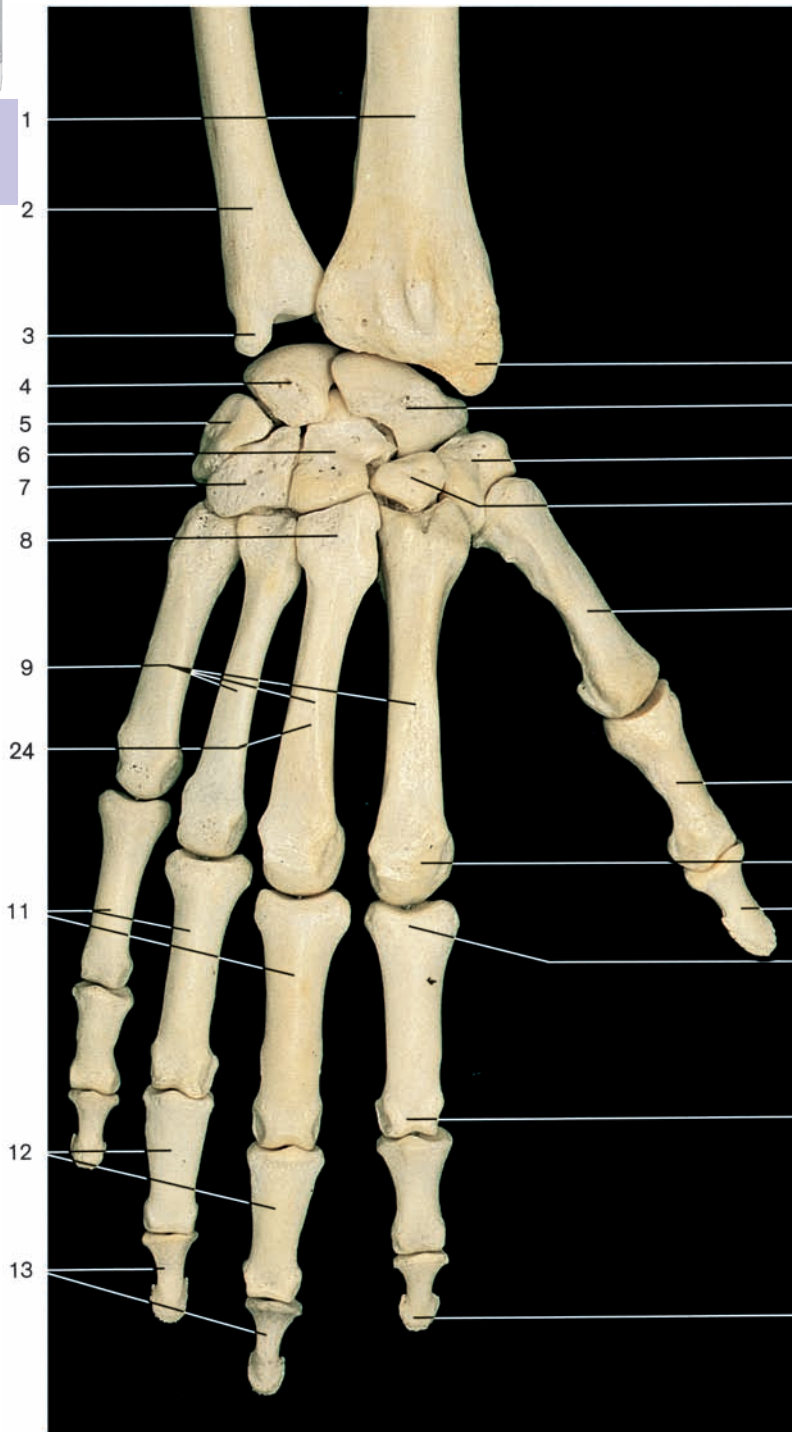


Skeleton of right forearm and hand in supination.

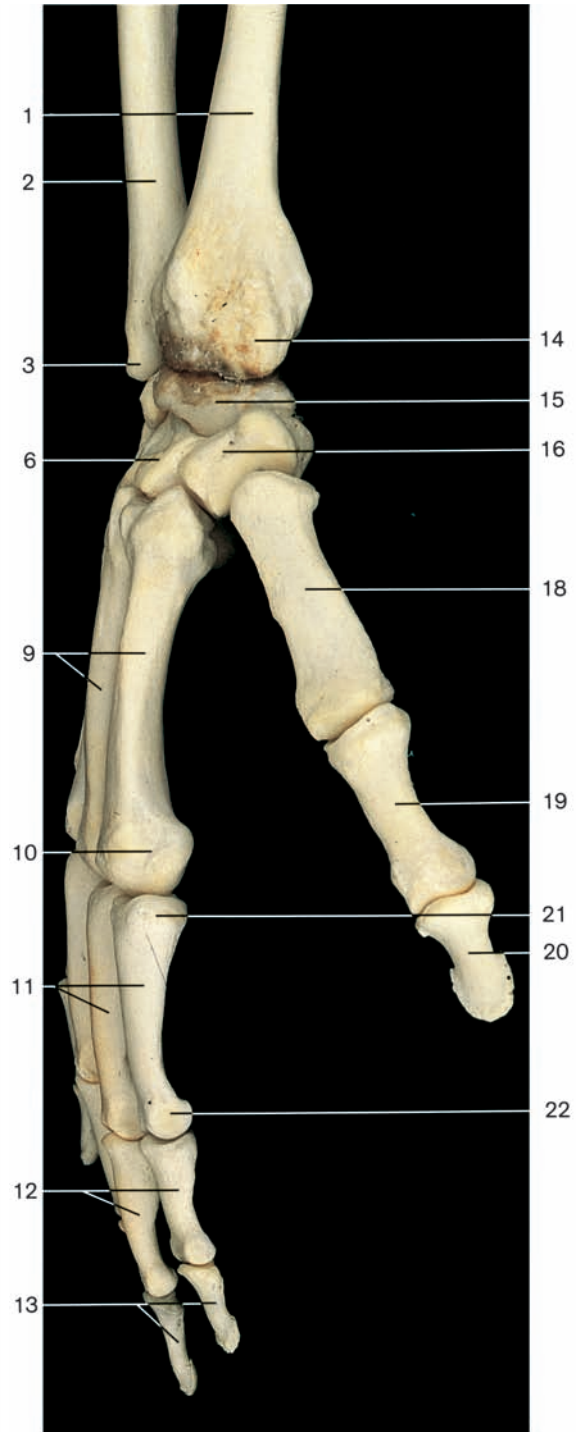
- | | |
|-------------------------------------|-----------------------------------|
| 1 Humerus | 9 Articular circumference of ulna |
| 2 Trochlea of humerus | 10 Carpal bones |
| 3 Capitulum of humerus | 11 Metacarpal bones |
| 4 Articular circumference of radius | 12 Proximal phalanges |
| 5 Radial tuberosity | 13 Middle phalanges |
| 6 Anterior surface of ulna | 14 Distal phalanges |
| 7 Posterior surface of radius | 15 Metacarpal bone of thumb |
| 8 Anterior surface of radius | 16 Proximal phalanx of thumb |

Sites of joints

- | | |
|----|------------------------------------|
| 17 | Humeroradial joint |
| 18 | Humero-ulnar joint |
| 19 | Proximal radio-ulnar joint |
| 20 | Distal radio-ulnar joint |
| 21 | Wrist joint |
| 22 | Midcarpal joint |
| 23 | Carpometacarpal joint of thumb |
| 24 | Carpometacarpal joints |
| 25 | Metacarpophalangeal joints |
| 26 | Interphalangeal joints of the hand |

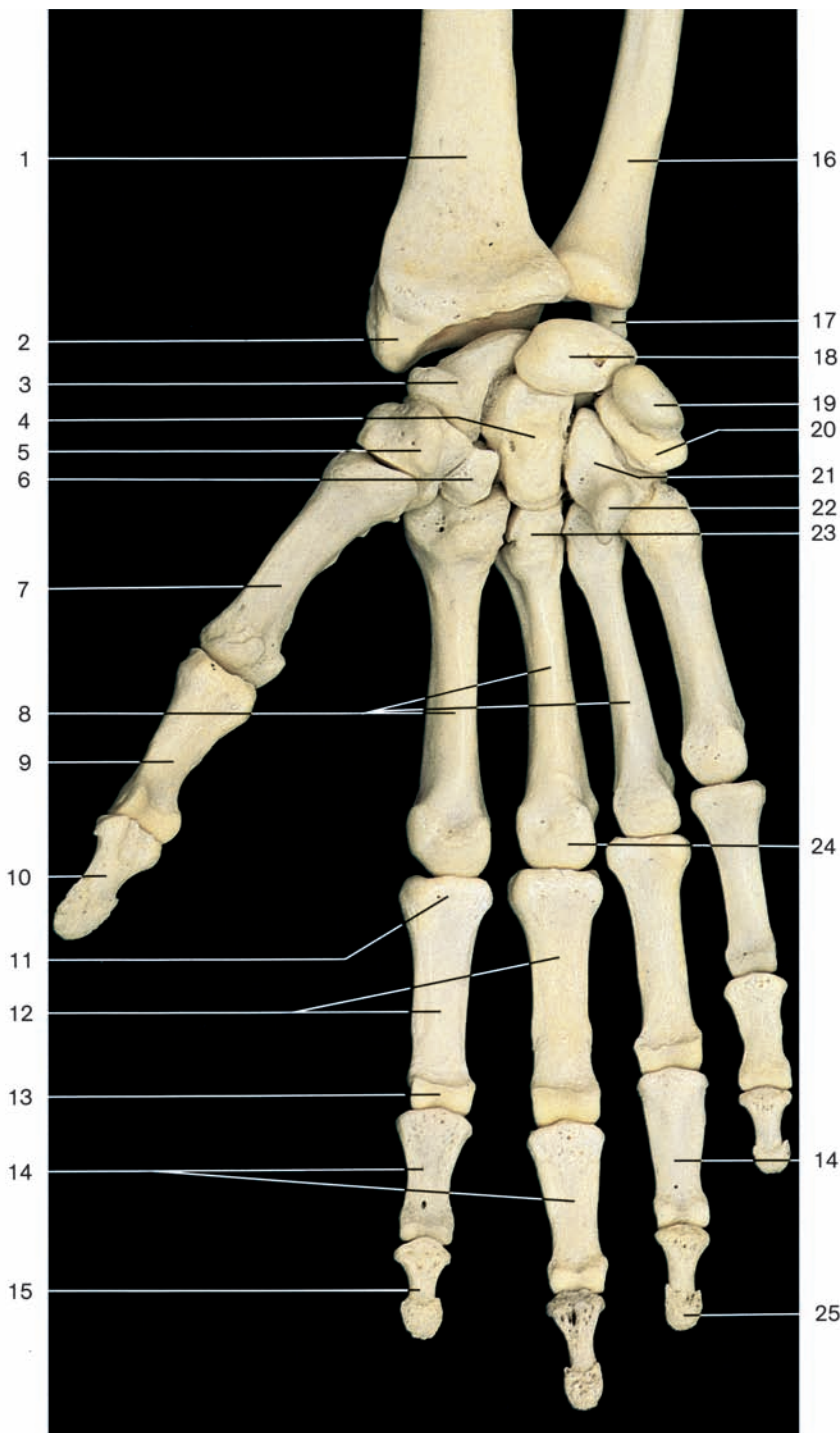


Skeleton of right wrist and hand (dorsal aspect).



Skeleton of right wrist and hand (medial aspect).

- | | | | |
|---------------------------|-----------------------------------|------------------------------------|------------------------------------|
| 1 Radius | 8 Base of third metacarpal bone | 15 Scaphoid bone | 22 Head of second proximal phalanx |
| 2 Ulna | 9 Metacarpal bones | 16 Trapezium bone | 23 Tuberosity of distal phalanx |
| 3 Styloid process of ulna | 10 Head of metacarpal bone | 17 Trapezoid bone | 24 Body of third metacarpal bone |
| 4 Lunate bone | 11 Proximal phalanges of the hand | 18 Metacarpal bone of thumb | |
| 5 Triquetral bone | 12 Middle phalanges of the hand | 19 Proximal phalanx of thumb | |
| 6 Capitate bone | 13 Distal phalanges of the hand | 20 Distal phalanx of thumb | |
| 7 Hamate bone | 14 Styloid process of radius | 21 Base of second proximal phalanx | |

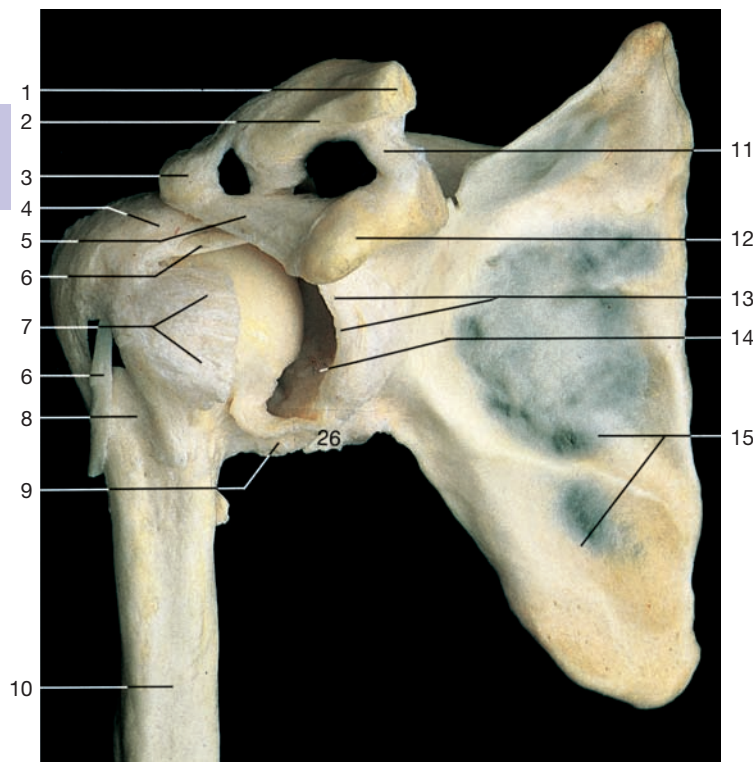


- 1 Radius
- 2 Styloid process of radius
- 3 Scaphoid bone
- 4 Capitate bone
- 5 Trapezium
- 6 Trapezoid bone
- 7 First metacarpal bone
- 8 Second to fourth metacarpal bones
- 9 Proximal phalanx of thumb
- 10 Distal phalanx of thumb
- 11 Base of second proximal phalanx
- 12 Proximal phalanges
- 13 Head of second proximal phalanx
- 14 Middle phalanges
- 15 Distal phalanx
- 16 Ulna
- 17 Styloid process of ulna
- 18 Lunate bone
- 19 Pisiform bone
- 20 Triquetral bone
- 21 Hamate bone
- 22 Hamulus or hook of hamate bone
- 23 Base of third metacarpal bone
- 24 Head of metacarpal bone
- 25 Tuberosity of distal phalanx

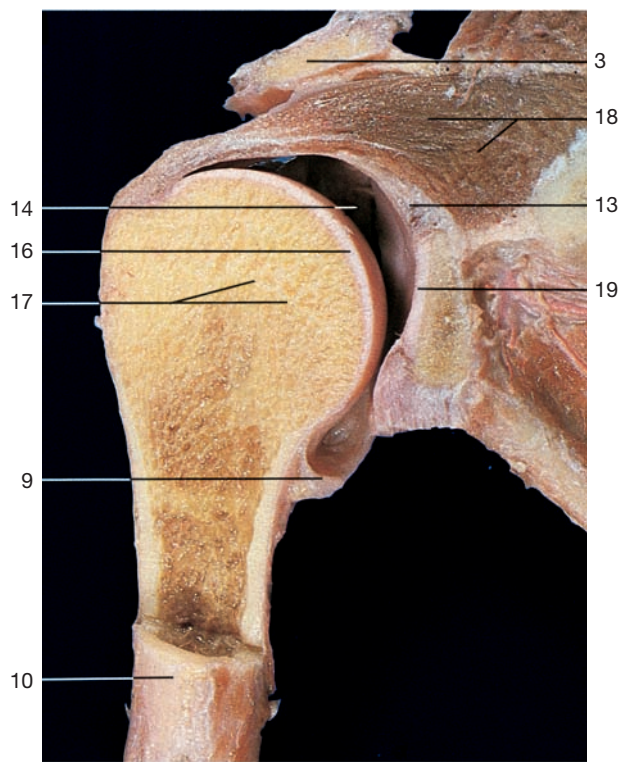
Skeleton of right wrist and hand (palmar aspect).

The human hand is one of the most admirable structures of the human body. The carpometacarpal joint of the thumb, a saddle joint, enjoys wide mobility so that the thumb can come into contact with all other fingers, thus enabling the hand to become an instrument for grasping and psychologic expression. During evolution, these newly developed functions

appeared after the erect posture of the human body was achieved. An inevitable prerequisite for the development of human cultures is not only the differentiation of the brain but also the development of an organ capable of realizing its ideas: the human hand.



Right shoulder joint. The anterior part of the articular capsule has been removed and the head of the humerus has been slightly rotated outward to show the cavity of the joint.

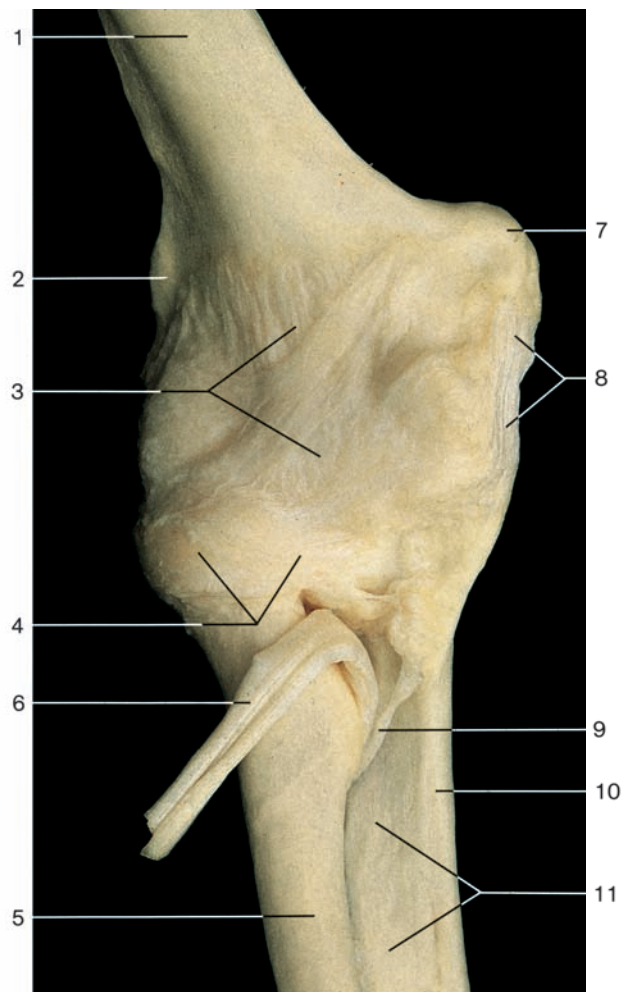


Coronal section through the right shoulder joint (anterior aspect).

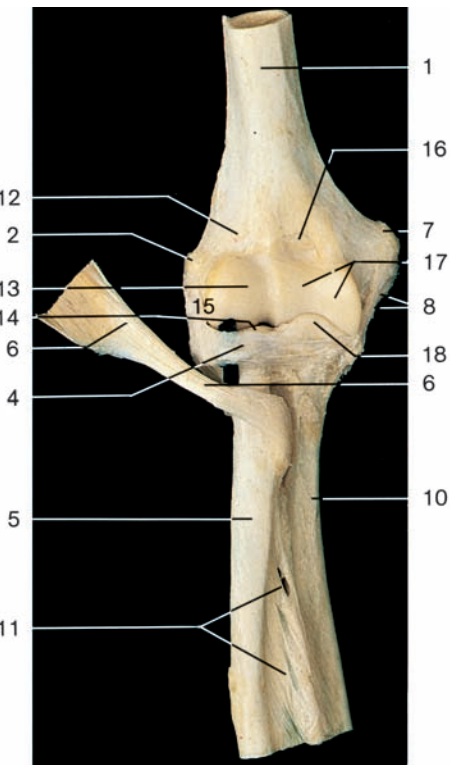


Coronal section through the right shoulder joint (MRI scan).
(Courtesy of Prof. Heuck, Munich, Germany.)

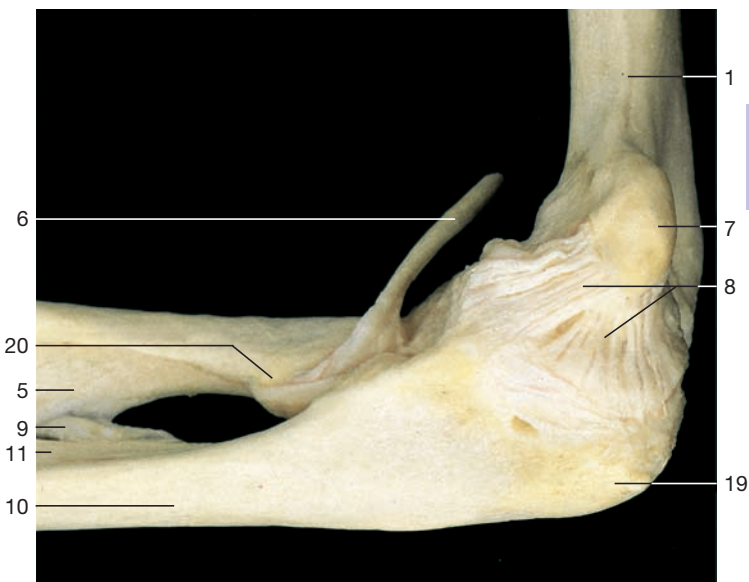
- 1 Acromial end of clavicle
- 2 Acromioclavicular joint
- 3 Acromion
- 4 Tendon of supraspinatus muscle (attached to the articular capsule)
- 5 Coraco-acromial ligament
- 6 Tendon of long head of biceps brachii muscle
- 7 Tendon of subscapularis muscle (attached to the articular capsule)
- 8 Intertubercular sulcus
- 9 Articular capsule of shoulder joint
- 10 Humerus
- 11 Trapezoid ligament
- 12 Coracoid process
- 13 Glenoid labrum
- 14 Shoulder joint (joint cavity)
- 15 Scapula
- 16 Head of humerus
- 17 Epiphysial line
- 18 Supraspinatus muscle
- 19 Glenoid cavity
- 20 Trapezius muscle
- 21 Suprascapular artery, vein, and nerve
- 22 Teres major muscle
- 23 Circumflexa scapular artery and vein
- 24 Latissimus dorsi muscle
- 25 Deltoid muscle
- 26 Tendon of long head of triceps brachii muscle



Ligaments of the elbow joint (anterior aspect).



Elbow joint with ligaments (anterior aspect). Articular capsule has been removed to show the annular ligament.

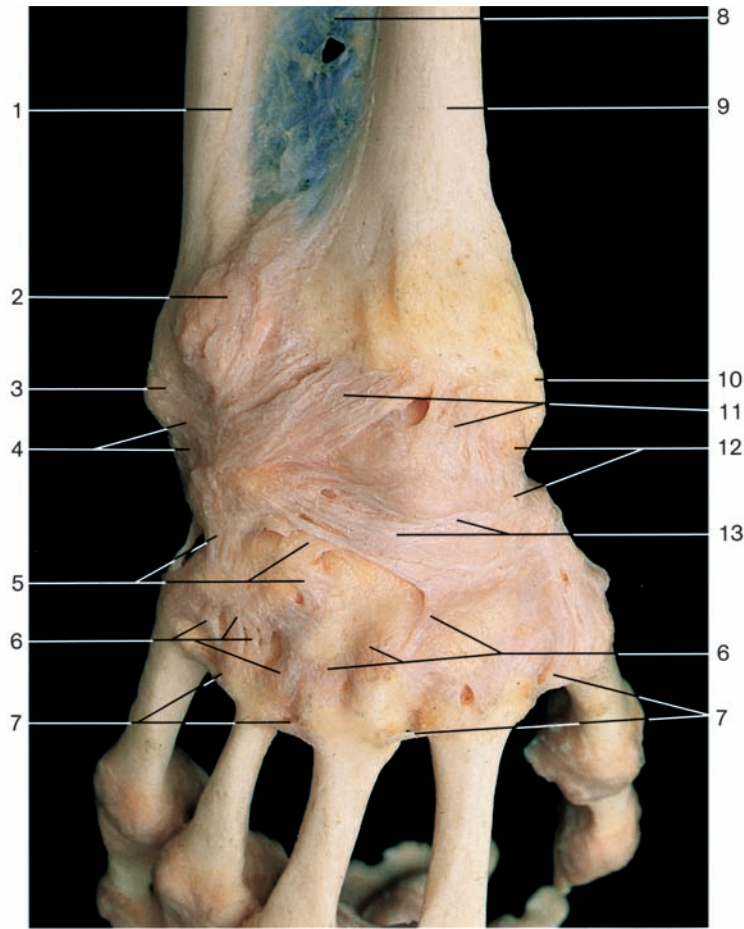


Ligaments of the elbow joint (medial aspect).

- | | |
|--|-------------------------------|
| 1 Humerus | 11 Interosseous membrane |
| 2 Lateral epicondyle of humerus | 12 Radial fossa |
| 3 Articular capsule | 13 Capitulum of humerus |
| 4 Annular ligament of proximal radio-ulnar joint | 14 Head of radius |
| 5 Radius | 15 Radial collateral ligament |
| 6 Tendon of biceps brachii muscle | 16 Coronoid fossa |
| 7 Medial epicondyle of humerus | 17 Trochlea of humerus |
| 8 Ulnar collateral ligament | 18 Coronoid process of ulna |
| 9 Oblique cord | 19 Olecranon |
| 10 Ulna | 20 Radial tuberosity |

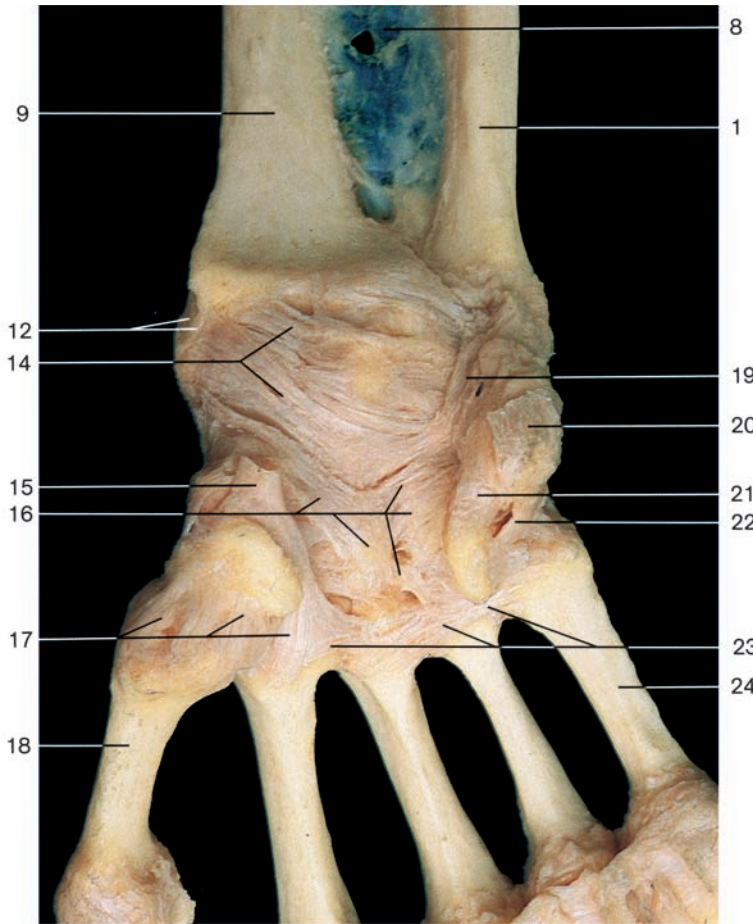


Coronal section through the elbow joint (MRI scan).
(Courtesy of Prof. Heuck, Munich, Germany.)

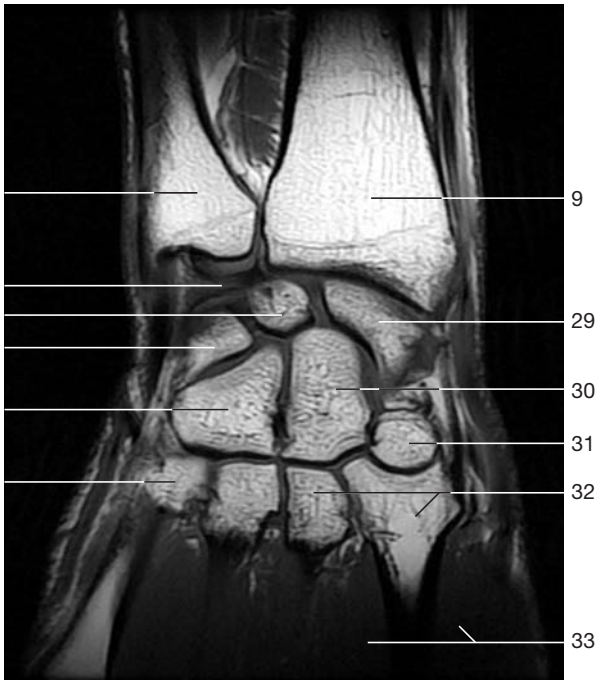


- 1 Ulna
- 2 Exostosis (pathological)
- 3 Head of ulna
- 4 Ulnar carpal collateral ligament
- 5 Deep intercarpal ligaments
- 6 Dorsal carpometacarpal ligaments
- 7 Dorsal metacarpal ligaments
- 8 Interosseous membrane
- 9 Radius
- 10 Styloid process of radius
- 11 Dorsal radiocarpal ligament
- 12 Radial collateral ligament
- 13 Articular capsule and dorsal intercarpal ligaments
- 14 Palmar radiocarpal ligament
- 15 Tendon of flexor carpi radialis muscle (cut)
- 16 Radiating carpal ligament
- 17 Palmar carpometacarpal ligaments
- 18 First metacarpal bone
- 19 Palmar ulnocarpal ligament
- 20 Tendon of flexor carpi ulnaris muscle (cut)
- 21 Pisohamate ligament
- 22 Pisometacarpal ligament
- 23 Palmar metacarpal ligaments
- 24 Fifth metacarpal bone
- 25 Articular disc (ulnocarpal)
- 26 Lunate bone
- 27 Triquetral bone
- 28 Hamate bone
- 29 Scaphoid (navicular) bone
- 30 Capitate bone
- 31 Trapezoid bone
- 32 Second and third metacarpal bones
- 33 Dorsal interossei muscles

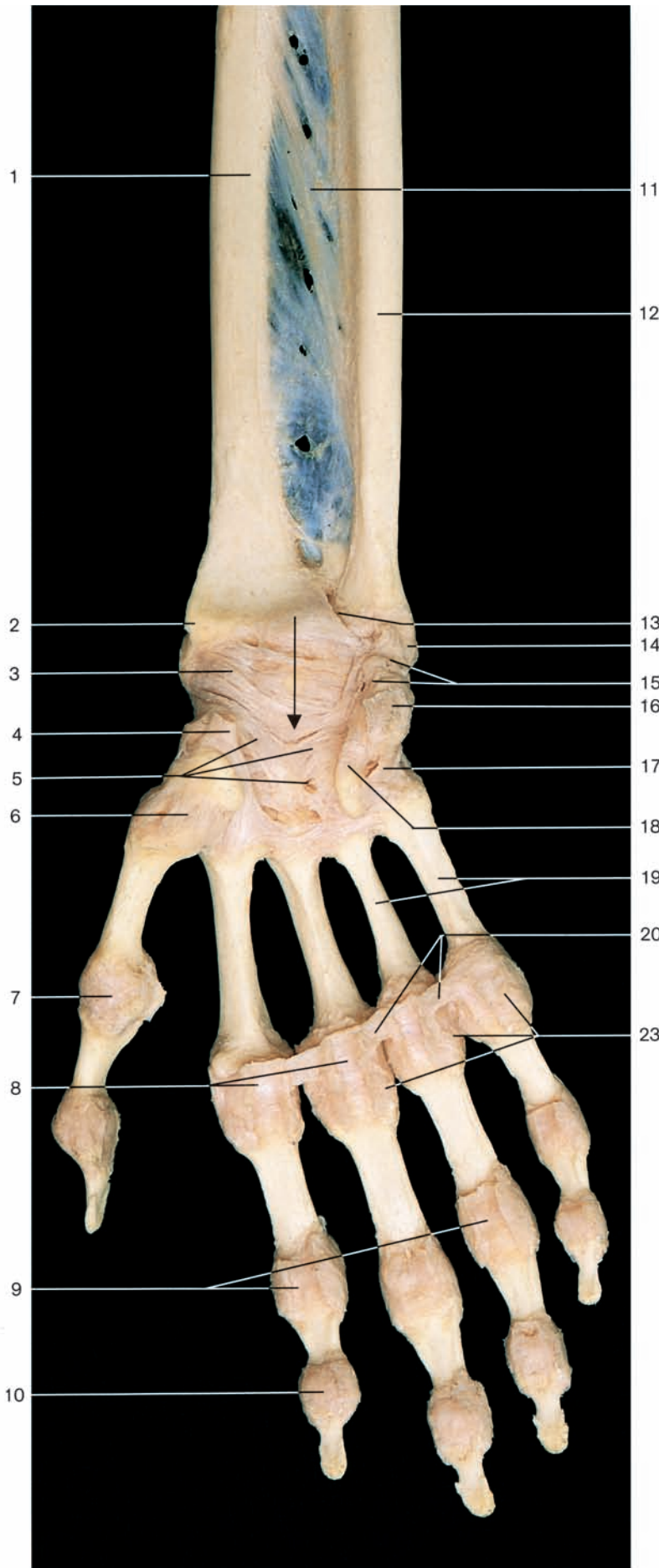
Ligaments of hand and wrist (dorsal aspect).



Ligaments of hand and wrist (palmar aspect).

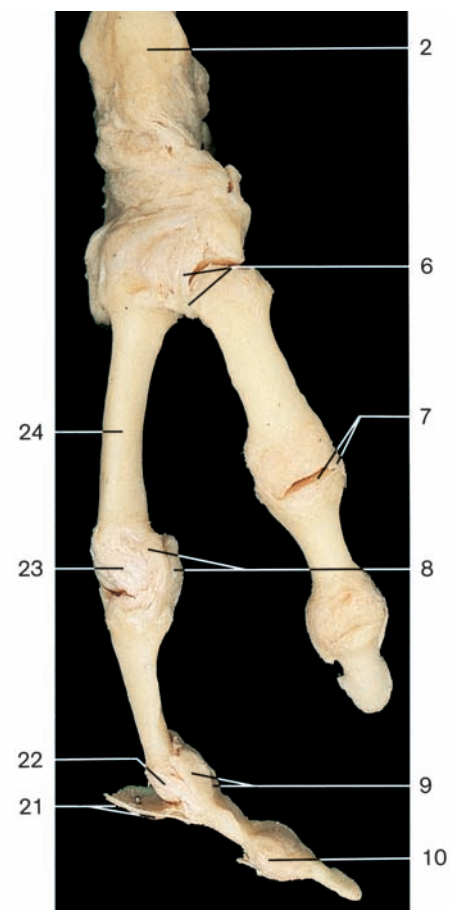


Coronal section through the hand and wrist (MRI scan). (Courtesy of Prof. Heuck, Munich, Germany.) Note the location of the wrist joint.

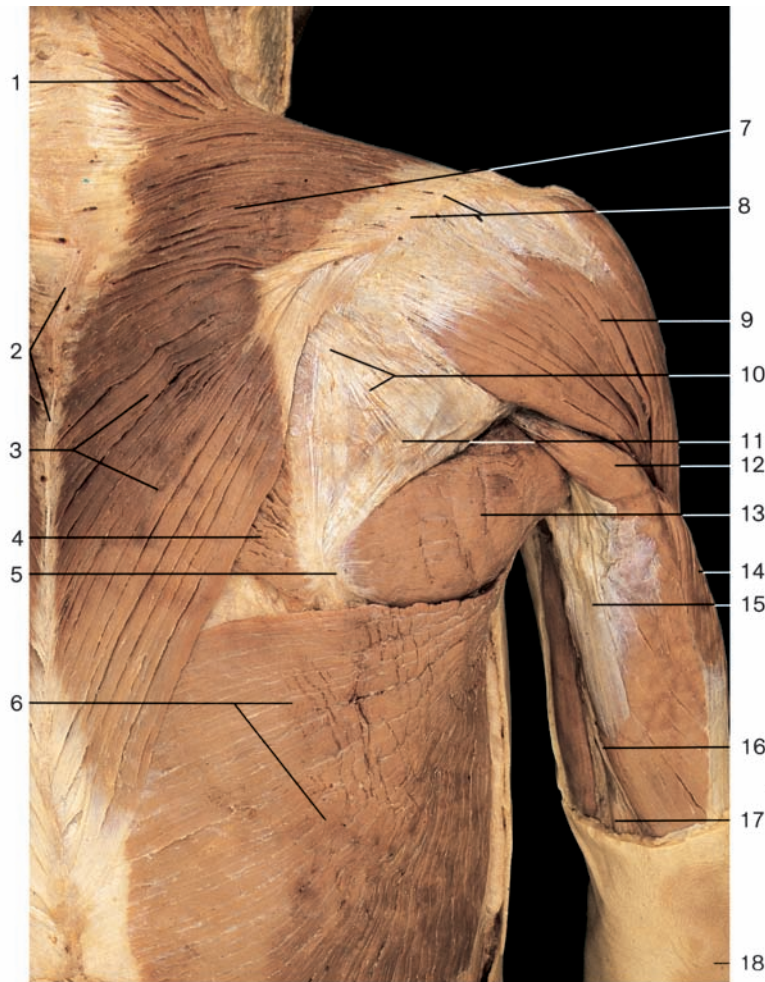


Ligaments of forearm, hand, and fingers (palmar aspect). The arrow indicates the location of the carpal tunnel.

- 1 Radius
- 2 Styloid process of radius
- 3 Palmar radiocarpal ligament
- 4 Tendon of flexor carpi radialis muscle (cut)
- 5 Radiating carpal ligament
- 6 Articular capsule of carpometacarpal joint of thumb
- 7 Articular capsule of metacarpophalangeal joint of thumb
- 8 Palmar ligaments and articular capsule of metacarpophalangeal joints
- 9 Palmar ligaments and articular capsule of interphalangeal joints
- 10 Articular capsule
- 11 Interosseous membrane
- 12 Ulna
- 13 Distal radio-ulnar joint
- 14 Styloid process of ulna
- 15 Palmar ulnocarpal ligament
- 16 Pisiform bone with tendon of flexor carpi ulnaris muscle
- 17 Pisometacarpal ligament
- 18 Pisohamate ligament
- 19 Metacarpal bones
- 20 Deep transverse metacarpal ligaments
- 21 Tendons of extensor muscles and articular capsule
- 22 Collateral ligament of interphalangeal joint
- 23 Collateral ligaments of metacarpophalangeal joints
- 24 Second metacarpal bone



Ligaments of fingers (lateral aspect).



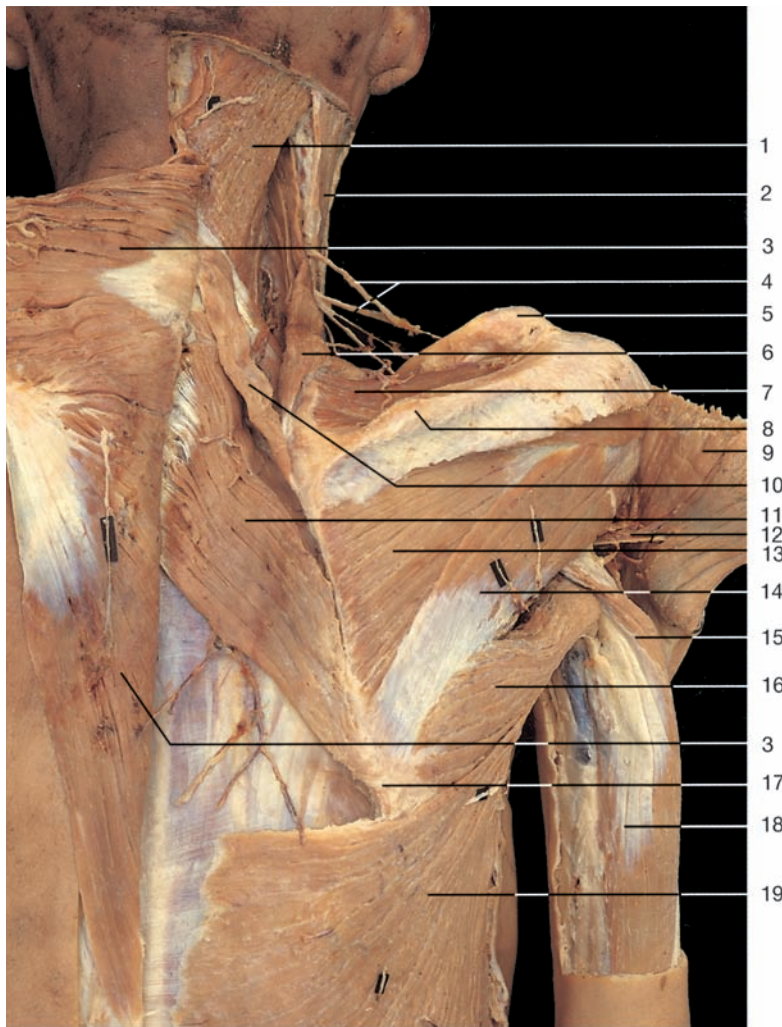
- 1 Descending fibers of trapezius muscle
- 2 Spinous processes of thoracic vertebrae
- 3 Ascending fibers of trapezius muscle
- 4 Rhomboid major muscle
- 5 Inferior angle of scapula
- 6 Latissimus dorsi muscle
- 7 Transverse fibers of trapezius muscle
- 8 Spine of scapula
- 9 Posterior fibers of deltoid muscle
- 10 Infraspinatus muscle and infraspinous fascia
- 11 Teres minor muscle and fascia
- 12 Long head of triceps brachii muscle
- 13 Teres major muscle
- 14 Lateral head of triceps brachii muscle
- 15 Tendon of triceps brachii muscle
- 16 Medial intermuscular septum
- 17 Ulnar nerve
- 18 Olecranon

Muscles of shoulder and arm, superficial layer (right side, posterior aspect).



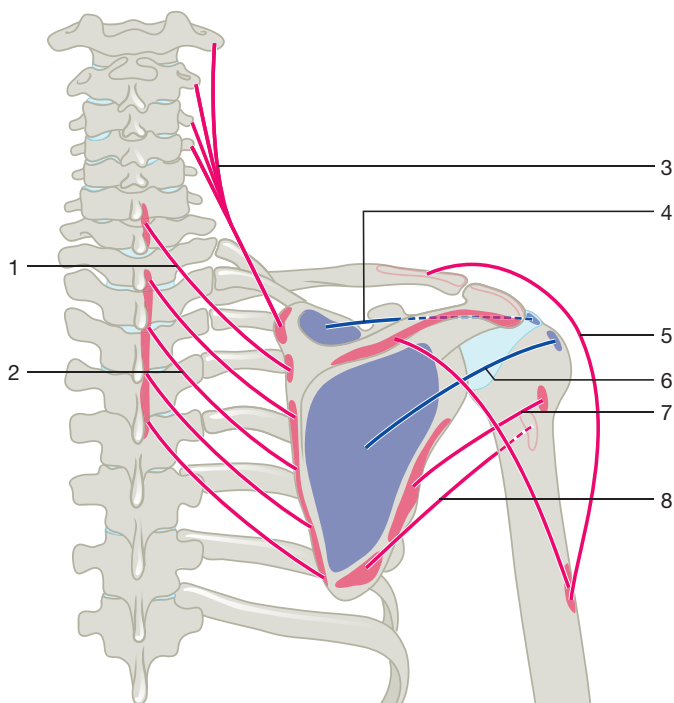
- 1 Trapezius muscle (reflected)
- 2 Levator scapulae muscle
- 3 Supraspinatus muscle
- 4 Rhomboid minor muscle
- 5 Medial border of scapula
- 6 Rhomboid major muscle
- 7 Infraspinatus muscle
- 8 Teres major muscle
- 9 Inferior angle of scapula
- 10 Cut edge of trapezius muscle
- 11 Intrinsic muscles of back with fascia
- 12 Latissimus dorsi muscle
- 13 Acromion
- 14 Spine of scapula
- 15 Deltoid muscle
- 16 Teres minor muscle
- 17 Long head of triceps brachii muscle
- 18 Lateral head of triceps brachii muscle
- 19 Medial head of triceps brachii muscle
- 20 Medial intermuscular septum
- 21 Tendon of triceps brachii muscle

Muscles of shoulder and arm, deeper layer (right side, posterior aspect). The trapezius muscle has been cut near its origin at the vertebral column and reflected upward.



- 1 Splenius capitis muscle
- 2 Sternocleidomastoid muscle
- 3 Trapezius muscle (reflected)
- 4 Lateral supraclavicular nerves
- 5 Clavicle
- 6 Levator scapulae muscle
- 7 Supraspinatus muscle
- 8 Spine of scapula
- 9 Deltoid muscle (reflected)
- 10 Rhomboid minor muscle
- 11 Rhomboid major muscle
- 12 Axillary nerve and posterior circumflex humeral artery
- 13 Infraspinatus muscle
- 14 Teres minor muscle
- 15 Long head of triceps brachii muscle
- 16 Teres major muscle
- 17 Inferior angle of scapula
- 18 Triceps brachii muscle
- 19 Latissimus dorsi muscle

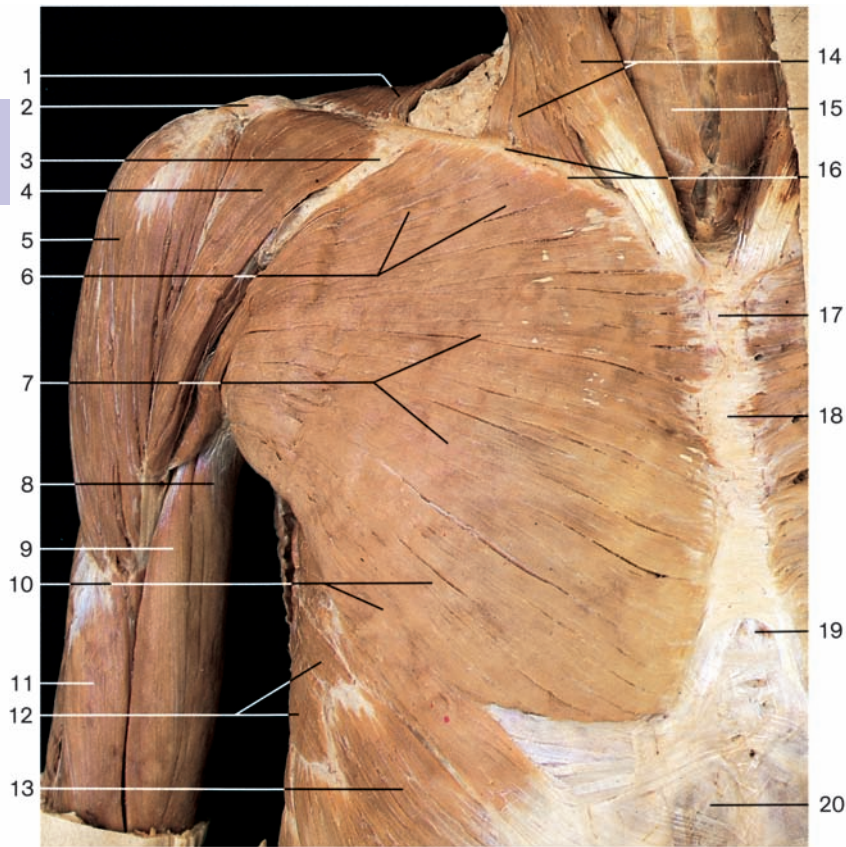
Muscles of shoulder and arm, deeper layer (right side, posterior aspect).
The trapezius and deltoid muscles have been divided and reflected.



Position and course of the main shoulder muscles
(posterior aspect).

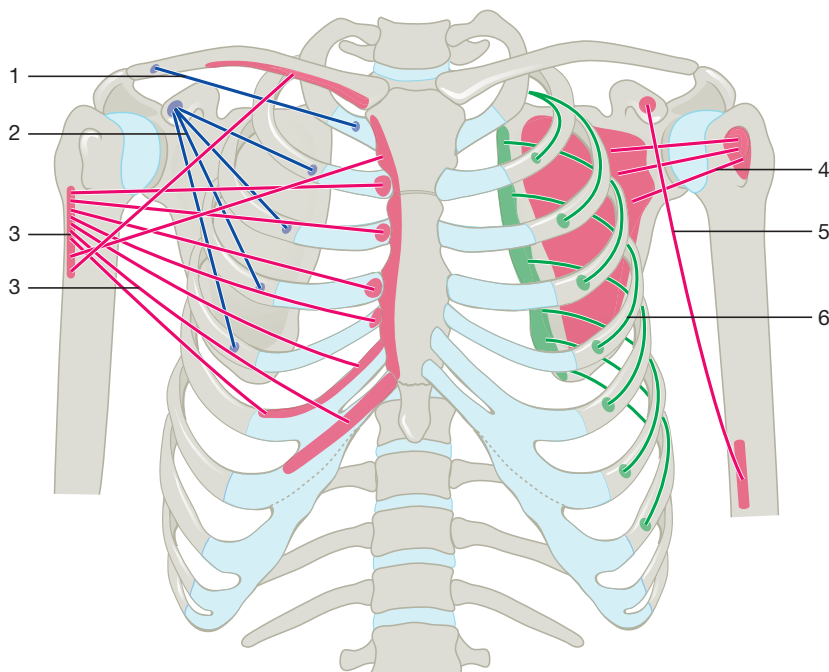


- 1 Rhomboid minor muscle (red)
- 2 Rhomboid major muscle (red)
- 3 Levator scapulae muscle (red)
- 4 Supraspinatus muscle (blue)
- 5 Deltoid muscle (red)
- 6 Infraspinatus muscle (blue)
- 7 Teres minor muscle (red)
- 8 Teres major muscle (red)



- 1 Trapezius muscle
- 2 Acromion
- 3 Deltopectoral triangle
- 4 Clavicular part of deltoid muscle (anterior fibers)
- 5 Acromial part of deltoid muscle (central fibers)
- 6 Clavicular part of pectoralis major muscle
- 7 Sternocostal part of pectoralis major muscle
- 8 Short head of biceps brachii muscle
- 9 Long head of biceps brachii muscle
- 10 Abdominal part of pectoralis major muscle
- 11 Brachialis muscle
- 12 Serratus anterior muscle
- 13 External abdominal oblique muscle
- 14 Sternocleidomastoid muscle
- 15 Infrahyoid muscles
- 16 Clavicle
- 17 Manubrium sterni
- 18 Body of sternum
- 19 Xiphoid process
- 20 Anterior layer of sheath of rectus abdominis muscle

Shoulder, arm, and pectoral muscles, superficial layer (right side, anterior aspect).

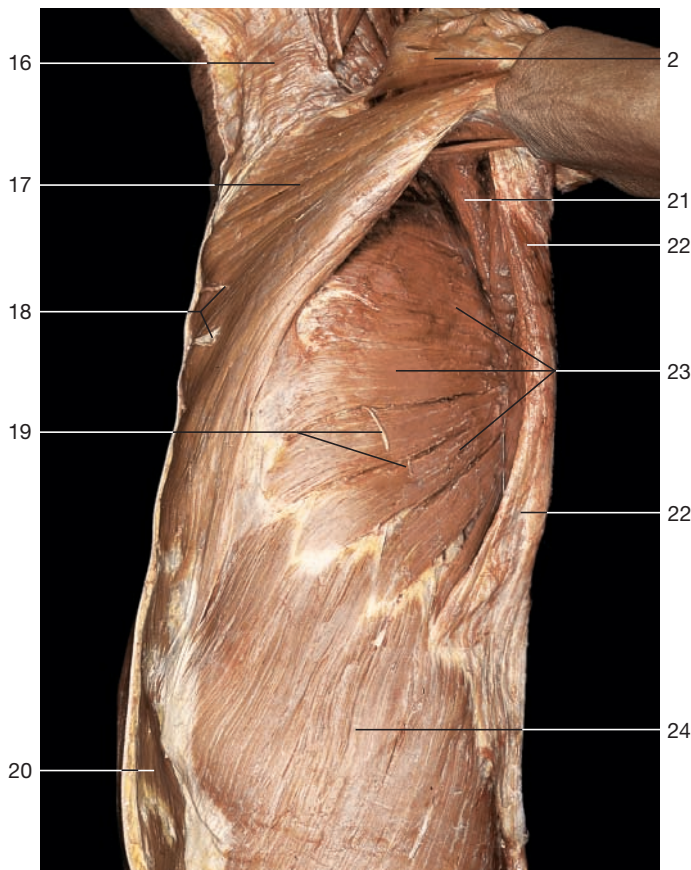


Position and course of pectoral and shoulder muscles (anterior aspect).

- 1 Subclavius muscle (blue)
- 2 Pectoralis minor muscle (blue)
- 3 Pectoralis major muscle (red)
- 4 Subscapularis muscle (red)
- 5 Coracobrachialis muscle (red)
- 6 Serratus anterior muscle (green)



Shoulder, arm, and pectoral muscles, deep layer (right side, anterior aspect).



- 1 Acromion
- 2 Clavicular part of deltoid muscle
- 3 Pectoralis major muscle (reflected)
- 4 Coracobrachialis muscle
- 5 Short head of biceps brachii muscle
- 6 Deltoid muscle (insertion on humerus)
- 7 Long head of biceps brachii muscle
- 8 Brachialis muscle
- 9 Sternocleidomastoid muscle
- 10 Clavicle
- 11 Subclavius muscle
- 12 Pectoralis minor muscle
- 13 Sternum
- 14 Third rib
- 15 Pectoralis major muscle (cut)
- 16 Platysma muscle
- 17 Pectoralis major muscle forming the anterior axillary fold
- 18 Anterior cutaneous branches of intercostal nerves
- 19 Lateral cutaneous branches of intercostal nerves
- 20 Rectus abdominis muscle
- 21 Subscapularis muscle
- 22 Latissimus dorsi muscle forming the posterior axillary fold
- 23 Serratus anterior muscle forming the medial wall of the axilla
- 24 External abdominal oblique muscle

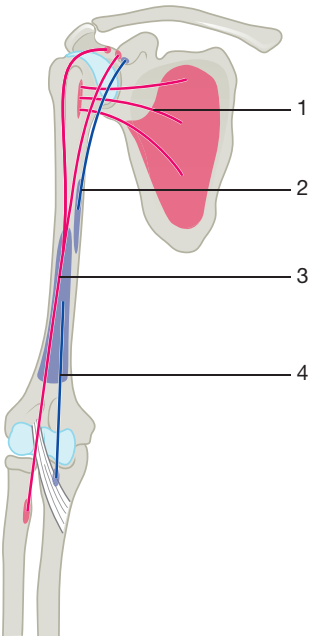
Axillary fossa and serratus anterior muscle (left side, lateral aspect).



Muscles of the arm (right side, lateral aspect).



Sagittal section through the arm (right side; MRI scan). (From Heuck et al., MRT-Atlas, 2009.)

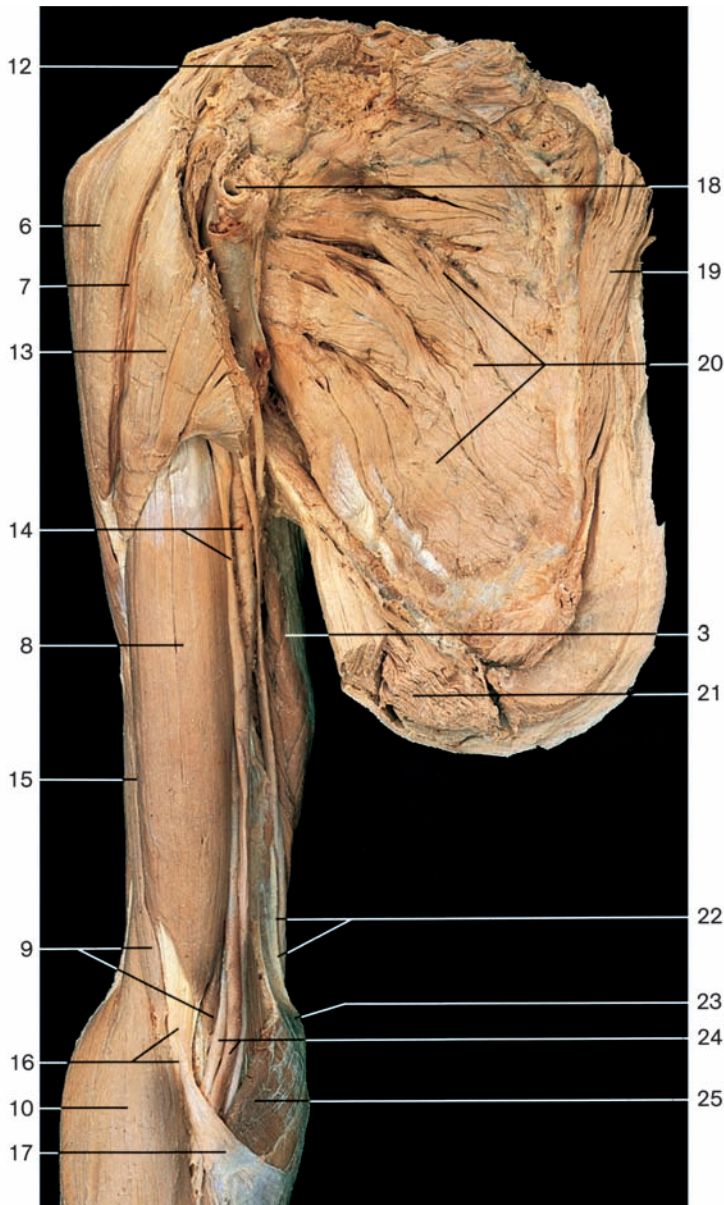


Position and course of flexors of the arm (anterior aspect).

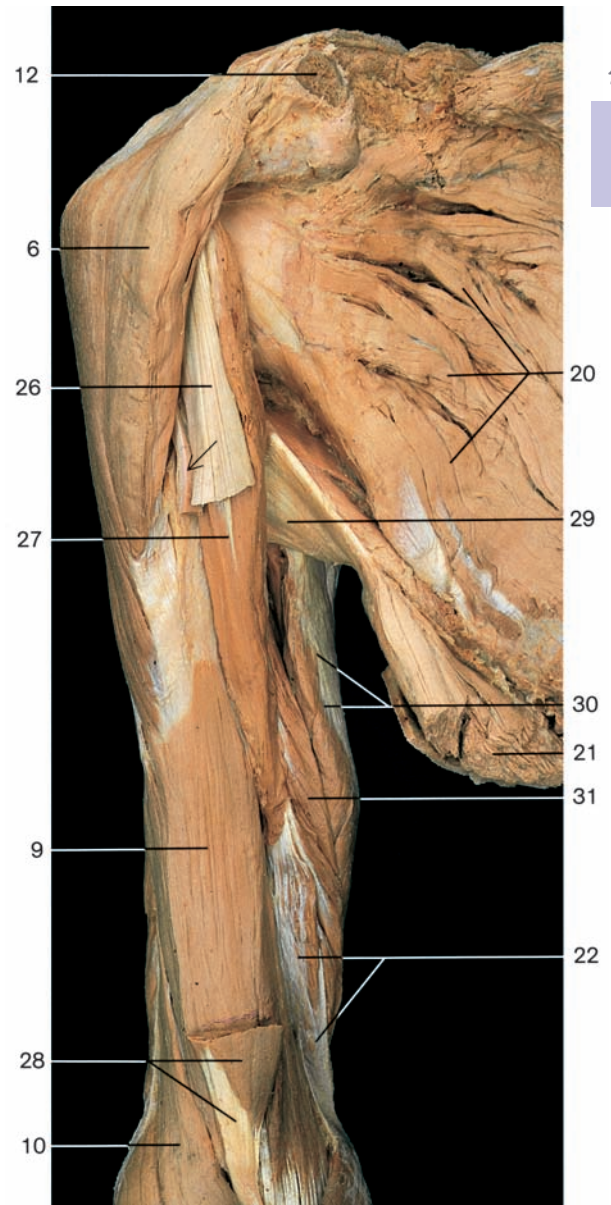
- 1 Subscapularis muscle (red)

2 Coracobrachialis muscle (blue)
- 3 Biceps brachii muscle (red)

4 Brachialis muscle (blue)



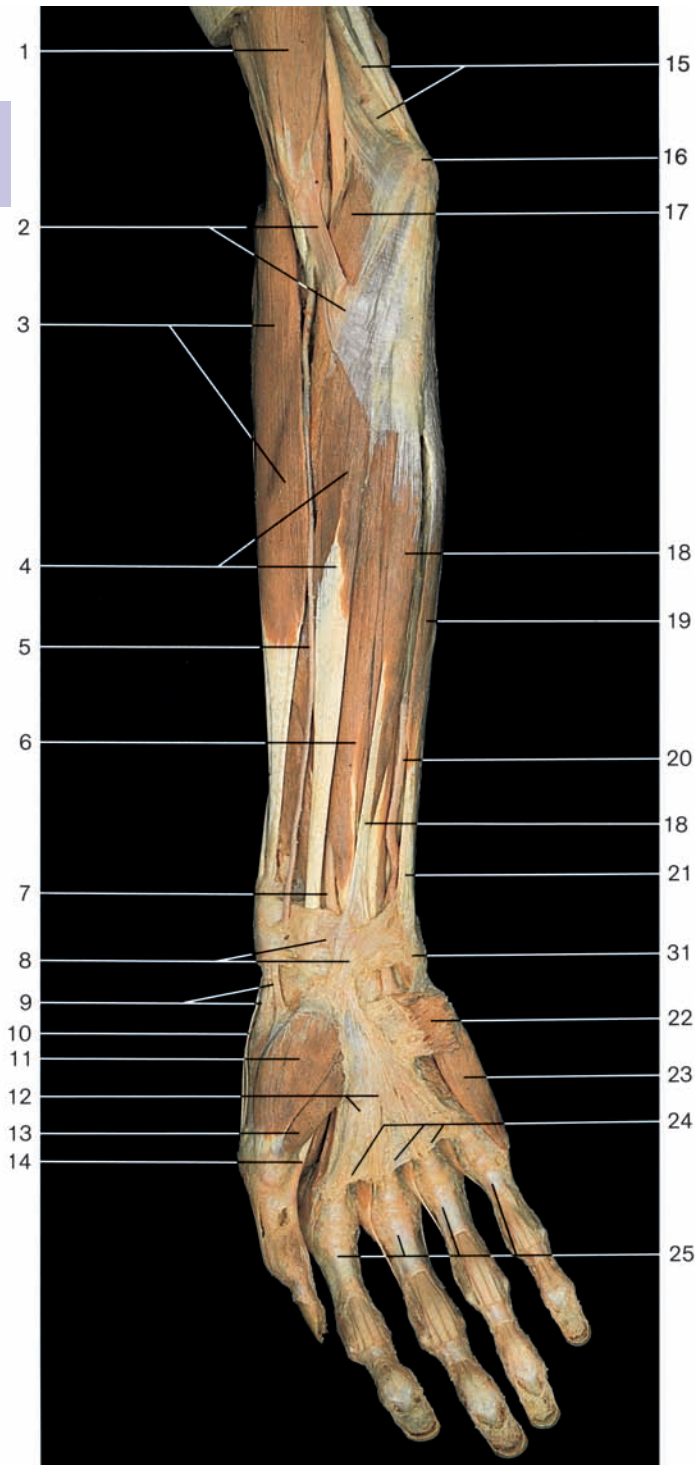
Muscles of the arm (right side, anterior aspect). The arm with the scapula and attached muscles has been removed from the trunk.



Muscles of the arm (right side, anterior aspect). Part of the biceps brachii muscle has been removed. Arrow: tendon of long head of biceps brachii muscle.

- 1 Acromial part of deltoid muscle (central fibers)
- 2 Scapular part of deltoid muscle (posterior fibers)
- 3 Triceps brachii muscle
- 4 Tendon of triceps brachii muscle
- 5 Olecranon
- 6 Clavicular part of deltoid muscle (anterior fibers)
- 7 Deltopectoral groove
- 8 Biceps brachii muscle
- 9 Brachialis muscle
- 10 Brachioradialis muscle
- 11 Extensor carpi radialis longus muscle
- 12 Clavicle (divided)
- 13 Pectoralis major muscle
- 14 Medial intermuscular septum with vessels and nerves
- 15 Lateral intermuscular septum
- 16 Tendon of biceps brachii muscle
- 17 Bicipital aponeurosis
- 18 Axillary artery
- 19 Rhomboid major muscle

- 20 Subscapularis muscle
- 21 Latissimus dorsi muscle (divided)
- 22 Medial intermuscular septum
- 23 Medial epicondyle of humerus
- 24 Brachial artery and median nerve
- 25 Pronator teres muscle
- 26 Tendon of short head of biceps brachii muscle
- 27 Coracobrachialis muscle
- 28 Distal part of biceps brachii muscle
- 29 Teres major muscle
- 30 Long head of triceps brachii muscle
- 31 Medial head of triceps brachii muscle
- 32 Radius
- 33 Head of humerus
- 34 Axillary nerve
- 35 Humerus
- 36 Trochlea
- 37 Ulna



Flexor muscles of forearm and hand, superficial layer
(right side, anterior aspect).

- 1 Biceps brachii muscle
- 2 Bicipital aponeurosis
- 3 Brachioradialis muscle
- 4 Flexor carpi radialis muscle
- 5 Radial artery
- 6 Flexor digitorum superficialis muscle
- 7 Median nerve
- 8 Antebrachial fascia and tendon of palmaris longus muscle
- 9 Tendon of abductor pollicis longus muscle
- 10 Tendon of extensor pollicis brevis muscle
- 11 Abductor pollicis brevis muscle



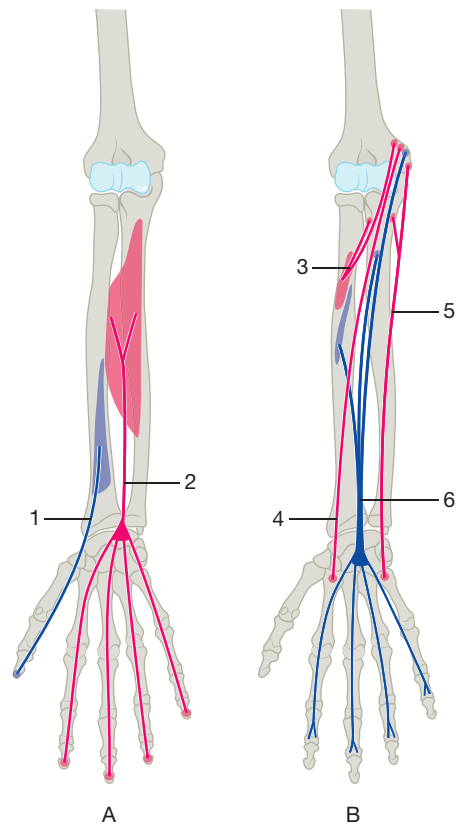
Flexor muscles of forearm and hand, superficial layer
(right side, anterior aspect). The palmaris longus and flexor carpi ulnaris muscles have been removed.

- 12 Palmar aponeurosis
- 13 Superficial head of flexor pollicis brevis muscle
- 14 Tendon of flexor pollicis longus muscle
- 15 Medial intermuscular septum
- 16 Medial epicondyle of humerus
- 17 Humeral head of pronator teres muscle
- 18 Palmaris longus muscle
- 19 Flexor carpi ulnaris muscle
- 20 Ulnar artery
- 21 Tendon of flexor carpi ulnaris muscle
- 22 Palmaris brevis muscle



Flexor muscles of forearm and hand, middle layer (right side, anterior aspect). The palmaris longus, flexor carpi radialis, and ulnaris muscles have been removed. The flexor retinaculum has been divided.

- 23 Abductor digiti minimi muscle
- 24 Transverse fasciculi of palmar aponeurosis
- 25 Digital fibrous sheaths of tendons of flexor digitorum muscle
- 26 Brachialis muscle
- 27 Flexor pollicis longus muscle
- 28 Carpal tunnel (canalis carpi, probe)
- 29 Triceps brachii muscle
- 30 Flexor digitorum superficialis muscle
- 31 Pisiform bone
- 32 Opponens digiti minimi muscle
- 33 Flexor digiti minimi brevis muscle
- 34 Tendons of flexor digitorum superficialis muscle



Position and course of flexors of forearm and hand (anterior aspect).

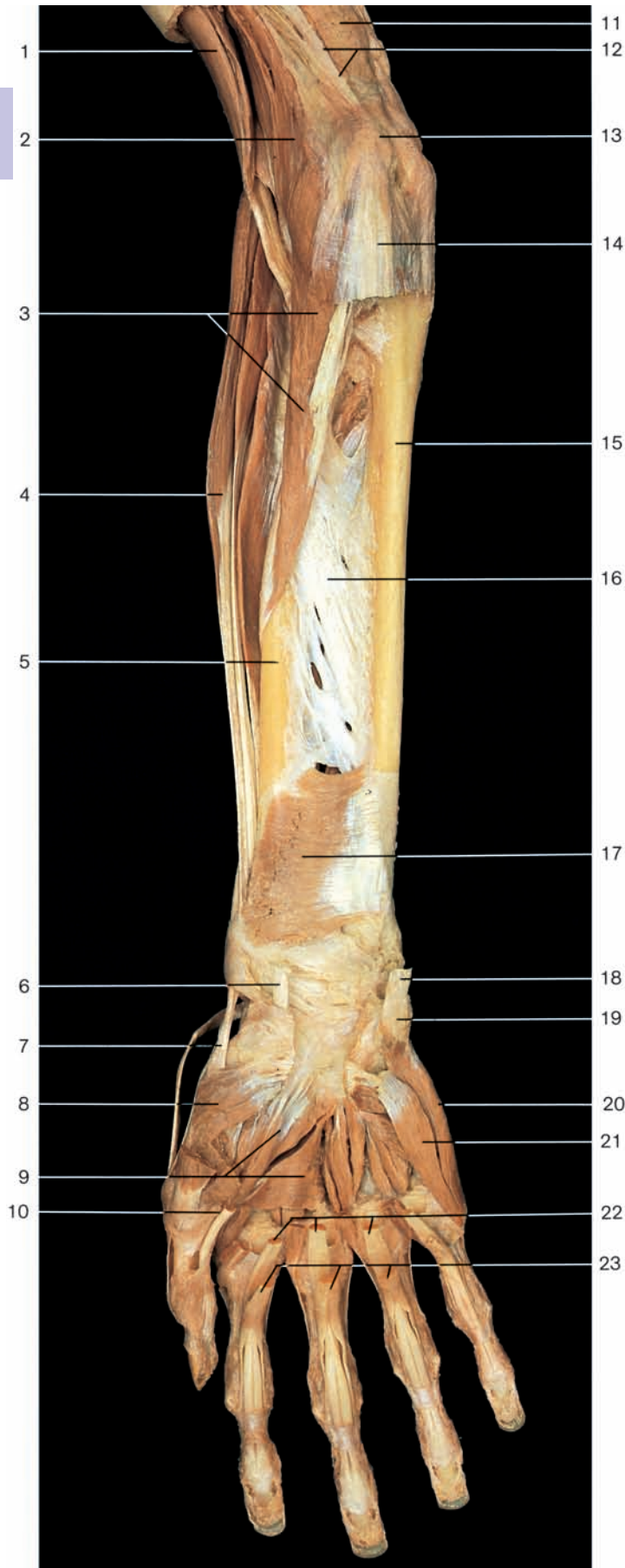
A Deep flexors

- 1 Flexor pollicis longus muscle (blue)
- 2 Flexor digitorum profundus muscle (red)

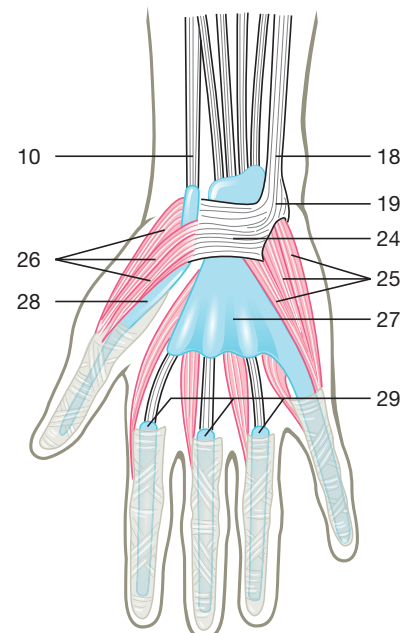
B Superficial flexors

- 3 Pronator teres muscle (red)
- 4 Flexor carpi radialis muscle (red)
- 5 Flexor carpi ulnaris muscle (red)
- 6 Flexor digitorum superficialis muscle (blue)

- 35 Supinator muscle
- 36 Radius and extensor carpi radialis brevis muscle
- 37 Flexor pollicis longus muscle
- 38 Tendon of flexor carpi radialis muscle
- 39 Pronator teres muscle (insertion of radius)
- 40 Flexor digitorum profundus muscle
- 41 Lumbrical muscles
- 42 Tendons of flexor digitorum profundus muscle
- 43 Tendons of flexor digitorum profundus muscle having passed through the divided tendons of the flexor digitorum superficialis muscle
- 44 Flexor retinaculum

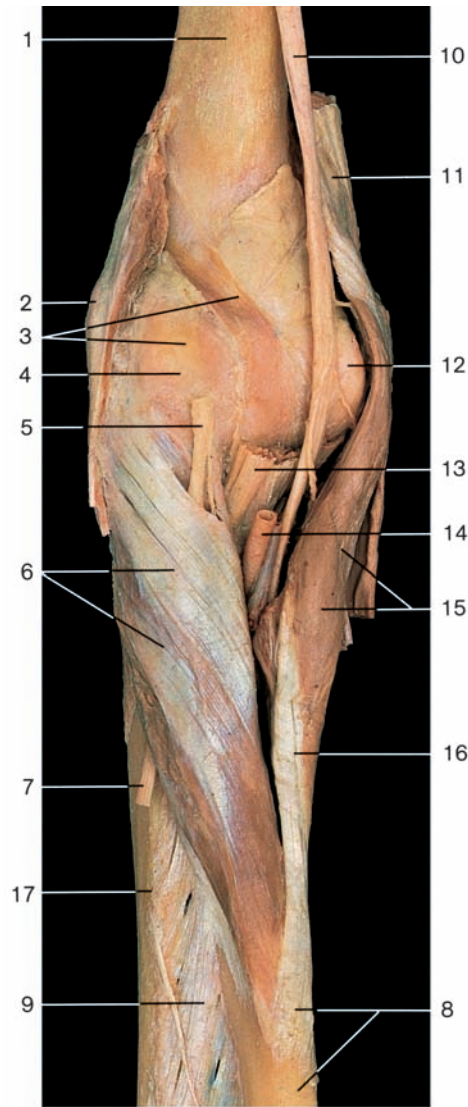


- 1 Biceps brachii muscle
- 2 Brachialis muscle
- 3 Pronator teres muscle
- 4 Brachioradialis muscle
- 5 Radius
- 6 Tendon of flexor carpi radialis muscle
- 7 Tendon of abductor pollicis longus muscle
- 8 Opponens pollicis muscle
- 9 Adductor pollicis muscle
- 10 Tendon of flexor pollicis longus muscle
- 11 Triceps brachii muscle
- 12 Medial intermuscular septum
- 13 Medial epicondyle of humerus
- 14 Common flexor mass (divided)
- 15 Ulna
- 16 Interosseous membrane
- 17 Pronator quadratus muscle
- 18 Tendon of flexor carpi ulnaris muscle
- 19 Pisiform bone
- 20 Abductor digiti minimi muscle
- 21 Flexor digiti minimi brevis muscle
- 22 Tendons of flexor digitorum profundus muscle
- 23 Tendons of flexor digitorum superficialis muscle
- 24 Flexor retinaculum
- 25 Hypothenar muscles
- 26 Thenar muscles
- 27 Common synovial sheath of flexor tendons
- 28 Synovial sheath of tendon of flexor pollicis longus muscle
- 29 Digital synovial sheaths of flexor tendons

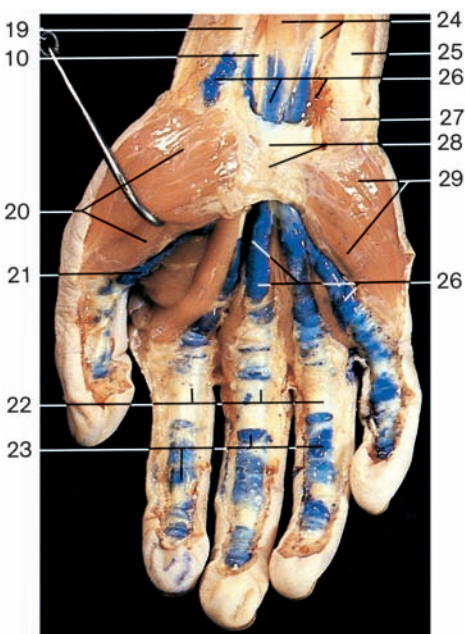


Flexor muscles of forearm and hand, deep layer (right side, anterior aspect). All flexors have been removed to display the pronator quadratus and pronator teres muscles together with the interosseous membrane. Forearm in supination.

Synovial sheaths of flexor tendons, indicated in blue (palmar aspect of right hand).

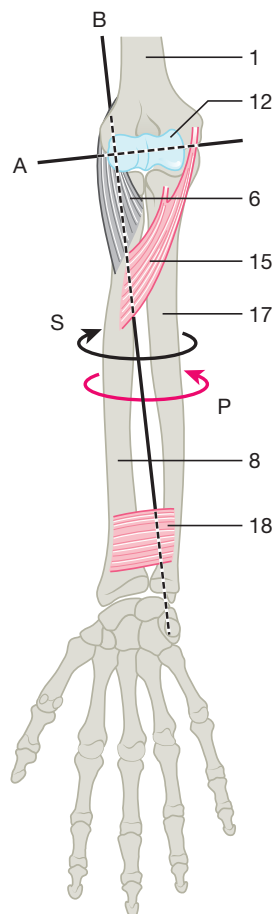


Right supinator muscle and elbow joint
(anterior aspect). Forearm in pronation.



Synovial sheaths of flexor tendons
(palmar aspect of right hand). The sheaths have been injected with blue gelatin.

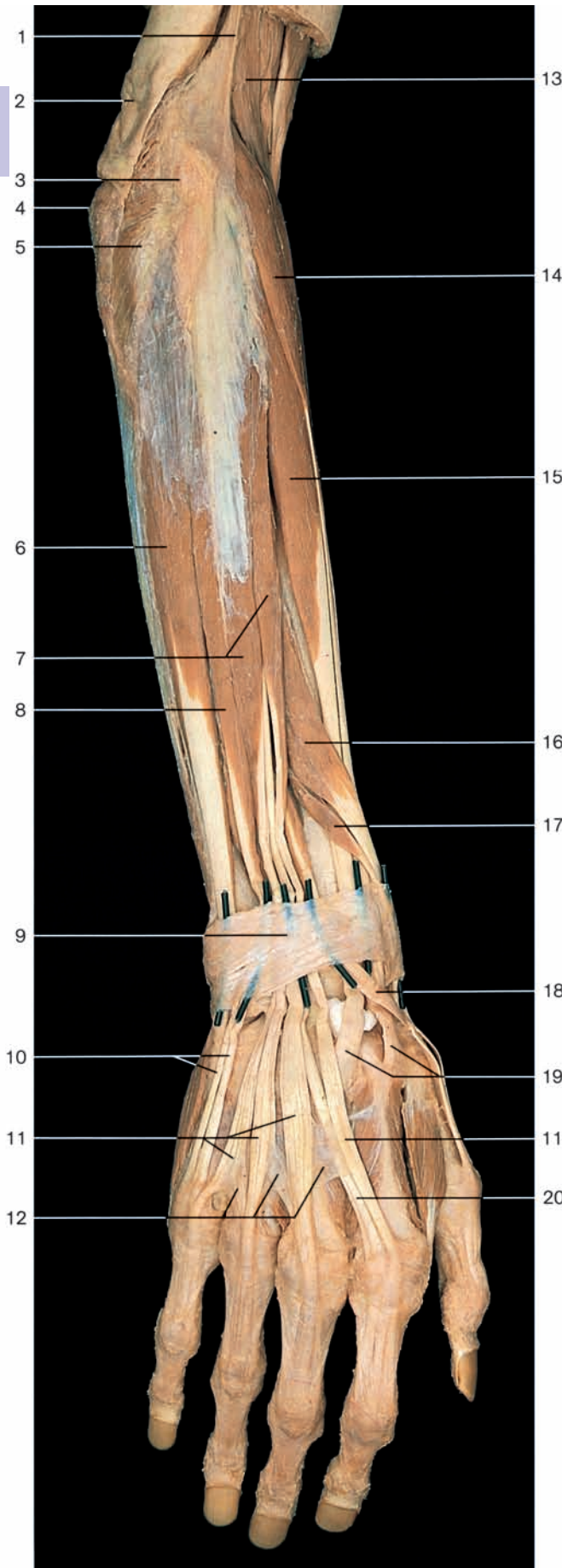
- 1 Humerus
- 2 Lateral epicondyle of humerus
- 3 Articular capsule
- 4 Position of capitulum of humerus
- 5 Deep branch of radial nerve
- 6 Supinator muscle
- 7 Entrance of deep branch of radial nerve to extensor muscles
- 8 Radius and insertion of pronator teres muscle
- 9 Interosseous membrane
- 10 Median nerve
- 11 Triceps brachii muscle
- 12 Trochlea of humerus
- 13 Tendon of biceps brachii muscle
- 14 Brachial artery
- 15 Pronator teres muscle
- 16 Tendon of pronator teres muscle
- 17 Ulna
- 18 Pronator quadratus muscle
- 19 Tendon of flexor carpi radialis muscle
- 20 Thenar muscles
- 21 Synovial sheath of tendon of flexor pollicis longus muscle
- 22 Fibrous sheath of flexor tendons
- 23 Digital synovial sheath of flexor tendons
- 24 Flexor digitorum superficialis muscle
- 25 Tendon of flexor carpi ulnaris muscle
- 26 Common synovial sheath of flexor tendons
- 27 Position of pisiform bone
- 28 Flexor retinaculum
- 29 Hypothenar muscles



A = Axis of flexion and extension
B = Axis of rotation

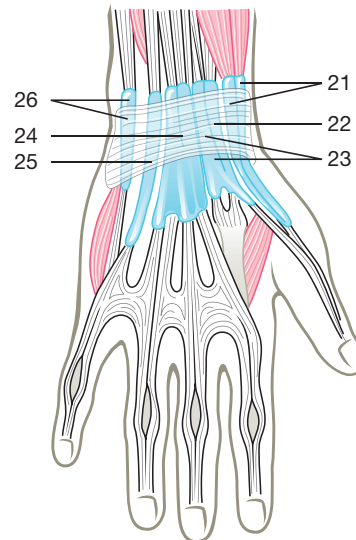
Arrows:
S = Supination
P = Pronation

Diagram illustrating the two axes of the elbow joint.

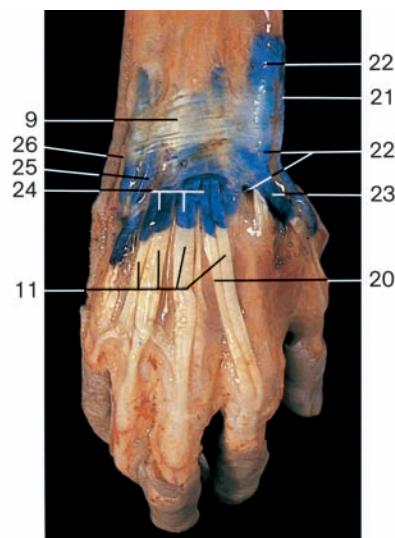


Extensor muscles of forearm and hand, superficial layer (right side, posterior aspect). Tunnels for extensor tendons indicated by probes.

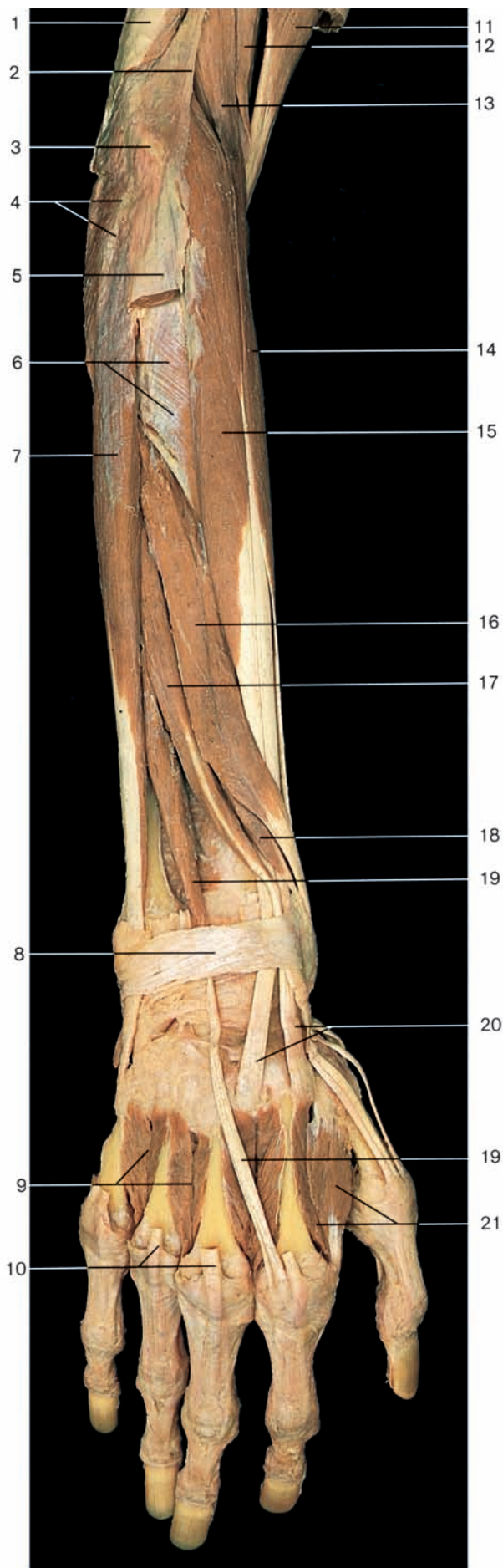
- 1 Lateral intermuscular septum
- 2 Tendon of triceps brachii muscle
- 3 Lateral epicondyle of humerus
- 4 Olecranon
- 5 Anconeus muscle
- 6 Extensor carpi ulnaris muscle
- 7 Extensor digitorum muscle
- 8 Extensor digiti minimi muscle
- 9 Extensor retinaculum
- 10 Tendons of extensor digiti minimi muscle
- 11 Tendons of extensor digitorum muscle
- 12 Intertendinous connections
- 13 Brachioradialis muscle
- 14 Extensor carpi radialis longus muscle
- 15 Extensor carpi radialis brevis muscle
- 16 Abductor pollicis longus muscle
- 17 Extensor pollicis brevis muscle
- 18 Tendon of extensor pollicis longus muscle
- 19 Tendons of both extensor carpi radialis longus and extensor carpi radialis brevis muscles
- 20 Tendon of extensor indicis muscle
- 21 First tunnel: Abductor pollicis longus muscle, extensor pollicis brevis muscle
- 22 Second tunnel: Extensor carpi radialis longus and brevis muscles
- 23 Third tunnel: Extensor pollicis longus muscle
- 24 Fourth tunnel: Extensor digitorum muscle, extensor indicis muscle
- 25 Fifth tunnel: Extensor digiti minimi muscle
- 26 Sixth tunnel: Extensor carpi ulnaris muscle



Synovial sheaths of extensor tendons, indicated in blue (dorsal aspect of right hand). Notice the six tunnels for the passage of the extensor tendons beneath the extensor retinaculum.

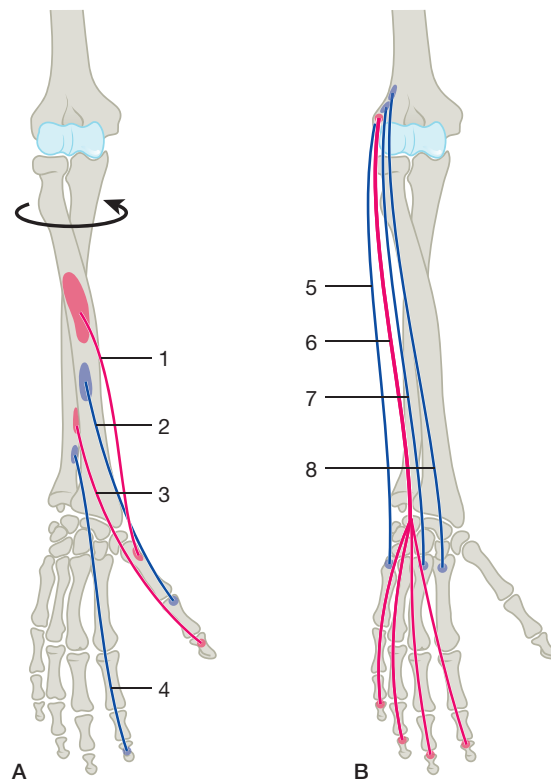


Synovial sheaths of extensor tendons (dorsal aspect of right hand). The sheaths have been injected with blue gelatin.



Extensor muscles of forearm and hand, deep layer (right side, posterior aspect).

- 1 Triceps brachii muscle
- 2 Lateral intermuscular septum
- 3 Lateral epicondyle of humerus
- 4 Anconeus muscle
- 5 Extensor digitorum and extensor digiti minimi muscles (cut)
- 6 Supinator muscle
- 7 Extensor carpi ulnaris muscle
- 8 Extensor retinaculum
- 9 Third and fourth dorsal interossei muscles
- 10 Tendons of extensor digitorum muscle (cut)
- 11 Biceps brachii muscle
- 12 Brachialis muscle
- 13 Brachioradialis muscle
- 14 Extensor carpi radialis longus muscle
- 15 Extensor carpi radialis brevis muscle
- 16 Abductor pollicis longus muscle
- 17 Extensor pollicis longus muscle
- 18 Extensor pollicis brevis muscle
- 19 Extensor indicis muscle
- 20 Tendons of extensor carpi radialis longus and extensor carpi radialis brevis muscles
- 21 First dorsal interosseous muscle



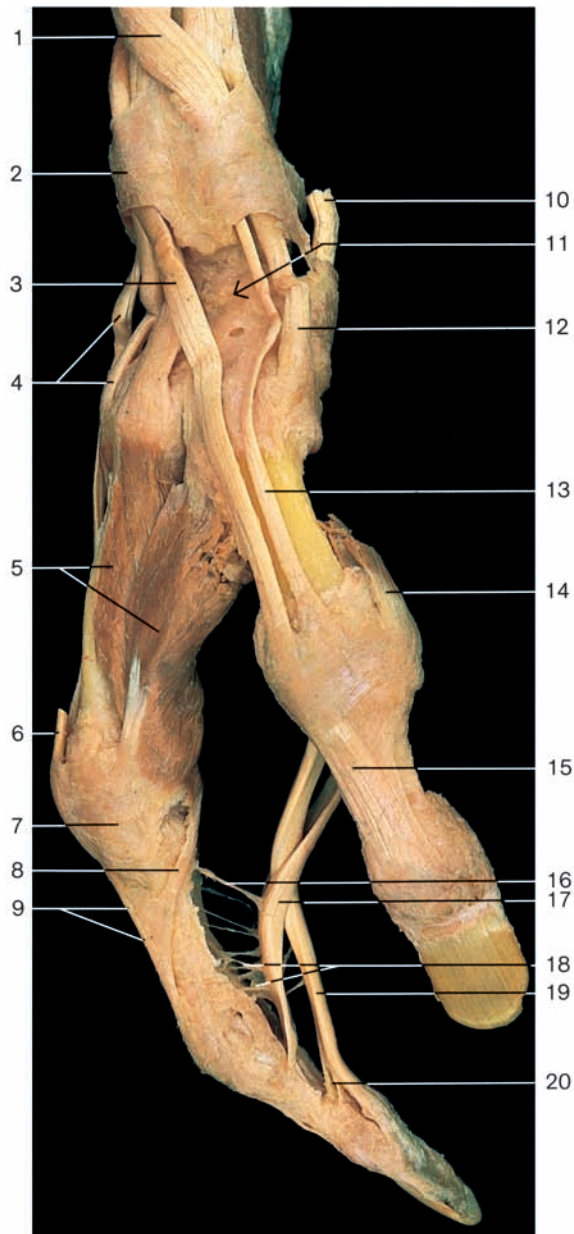
Position and course of extensors of forearm and hand (posterior aspect).

A Extensors of thumb

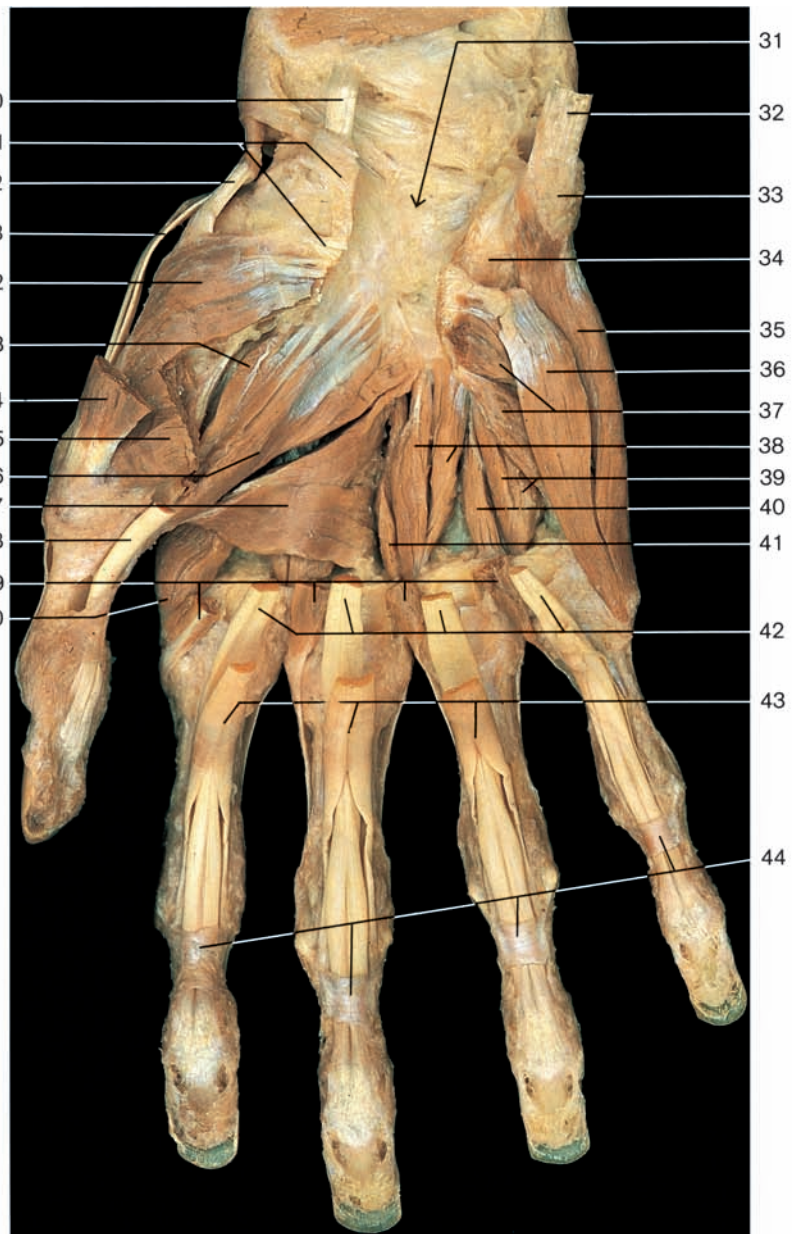
- 1 Abductor pollicis longus muscle (red)
- 2 Extensor pollicis brevis muscle (blue)
- 3 Extensor pollicis longus muscle (red)
- 4 Extensor indicis muscle (blue)

B Extensors of fingers and hand

- 5 Extensor carpi ulnaris muscle (blue)
- 6 Extensor digitorum muscle (red)
- 7 Extensor carpi radialis brevis muscle (blue)
- 8 Extensor carpi radialis longus muscle (blue)

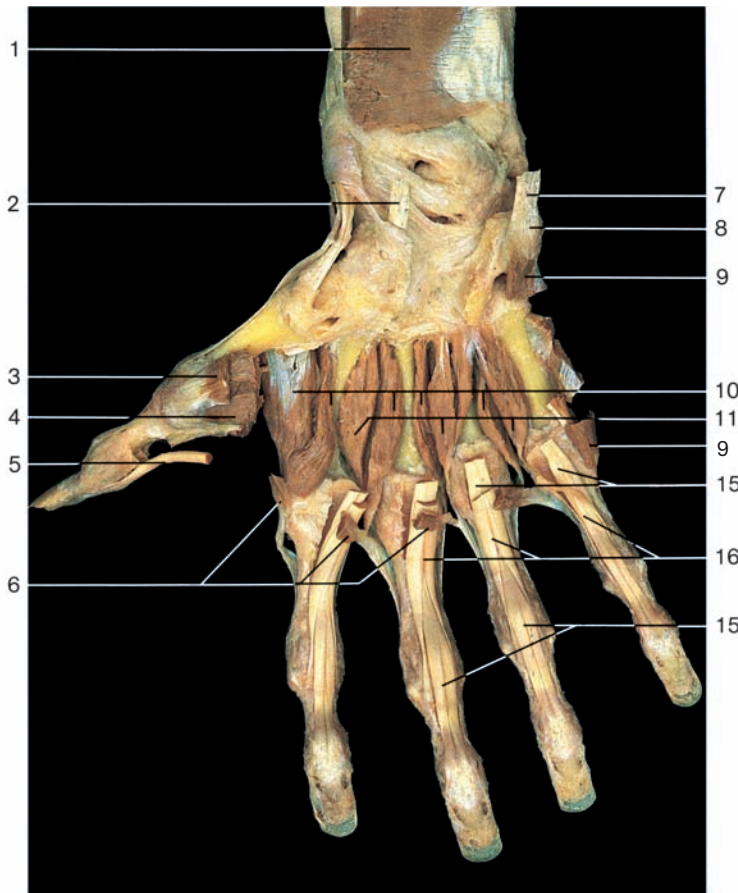


Muscles of thumb and index finger (medial aspect). The tendons of the extensor muscles of the thumb and the insertion of the flexor tendons of the index finger are displayed.

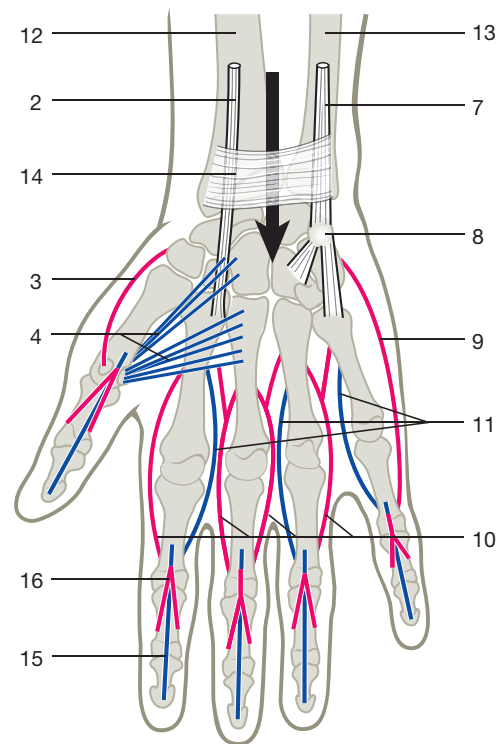


Muscles of the hand (right side, palmar aspect). The tendons of the flexor muscles and parts of the thumb muscles have been removed. The carpal tunnel has been opened.

- | | | |
|--|---|---|
| 1 Tendons of extensor pollicis brevis and abductor pollicis longus muscles | 15 Extensor expansion of extensor of thumb | 30 First dorsal interosseous muscle |
| 2 Extensor retinaculum | 16 Vinculum longum | 31 Position of carpal tunnel |
| 3 Tendon of extensor pollicis longus muscle | 17 Tendons of flexor digitorum superficialis muscle dividing to allow passage of deep tendons | 32 Tendon of flexor carpi ulnaris muscle |
| 4 Tendons of extensor carpi radialis longus and brevis muscles | 18 Vincula of flexor tendons | 33 Location of pisiform bone |
| 5 First dorsal interosseous muscle | 19 Tendon of flexor digitorum profundus muscle | 34 Hook of hamate bone |
| 6 Tendon of extensor digitorum muscle for index finger | 20 Vinculum breve | 35 Abductor digiti minimi muscle |
| 7 Location of metacarpophalangeal joint | 21 Radial carpal eminence (cut edge of flexor retinaculum) | 36 Flexor digiti minimi brevis muscle |
| 8 Tendon of lumbrical muscle | 22 Opponens pollicis muscle | 37 Opponens digiti minimi muscle |
| 9 Extensor expansion of index finger | 23 Deep head of flexor pollicis brevis muscle | 38 Second palmar interosseous muscle |
| 10 Tendon of flexor carpi radialis muscle (cut) | 24 Abductor pollicis brevis muscle (cut) | 39 Third palmar interosseous muscle |
| 11 Anatomical snuffbox | 25 Superficial head of flexor pollicis brevis muscle (cut) | 40 Fourth dorsal interosseous muscle |
| 12 Tendon of abductor pollicis longus muscle | 26 Oblique head of adductor pollicis muscle | 41 Third dorsal interosseous muscle |
| 13 Tendon of extensor pollicis brevis muscle | 27 Transverse head of adductor pollicis muscle | 42 Tendon of flexor digitorum profundus muscle (cut) |
| 14 Tendon of abductor pollicis brevis muscle | 28 Tendon of flexor pollicis longus muscle (cut) | 43 Tendons of flexor digitorum superficialis muscle (cut) |
| | 29 Lumbrical muscles (cut) | 44 Fibrous flexor sheaths |



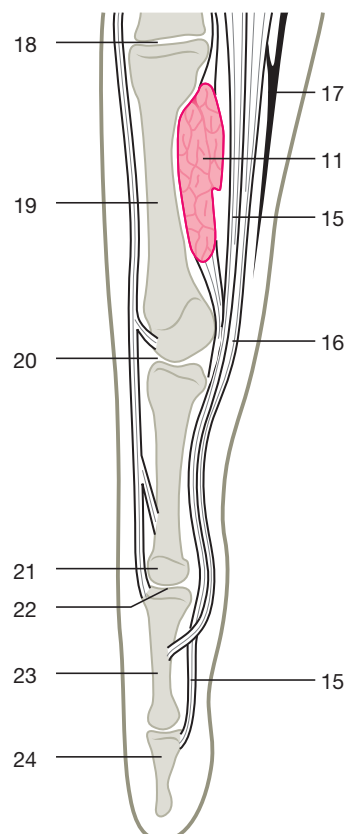
Muscles of the hand, deep layer (right side, palmar aspect). The thenar and hypothenar muscles have been removed to display the interossei muscles.



Actions of interossei muscles in abduction and adduction of fingers (palmar aspect of right hand). Arrow: carpal tunnel.

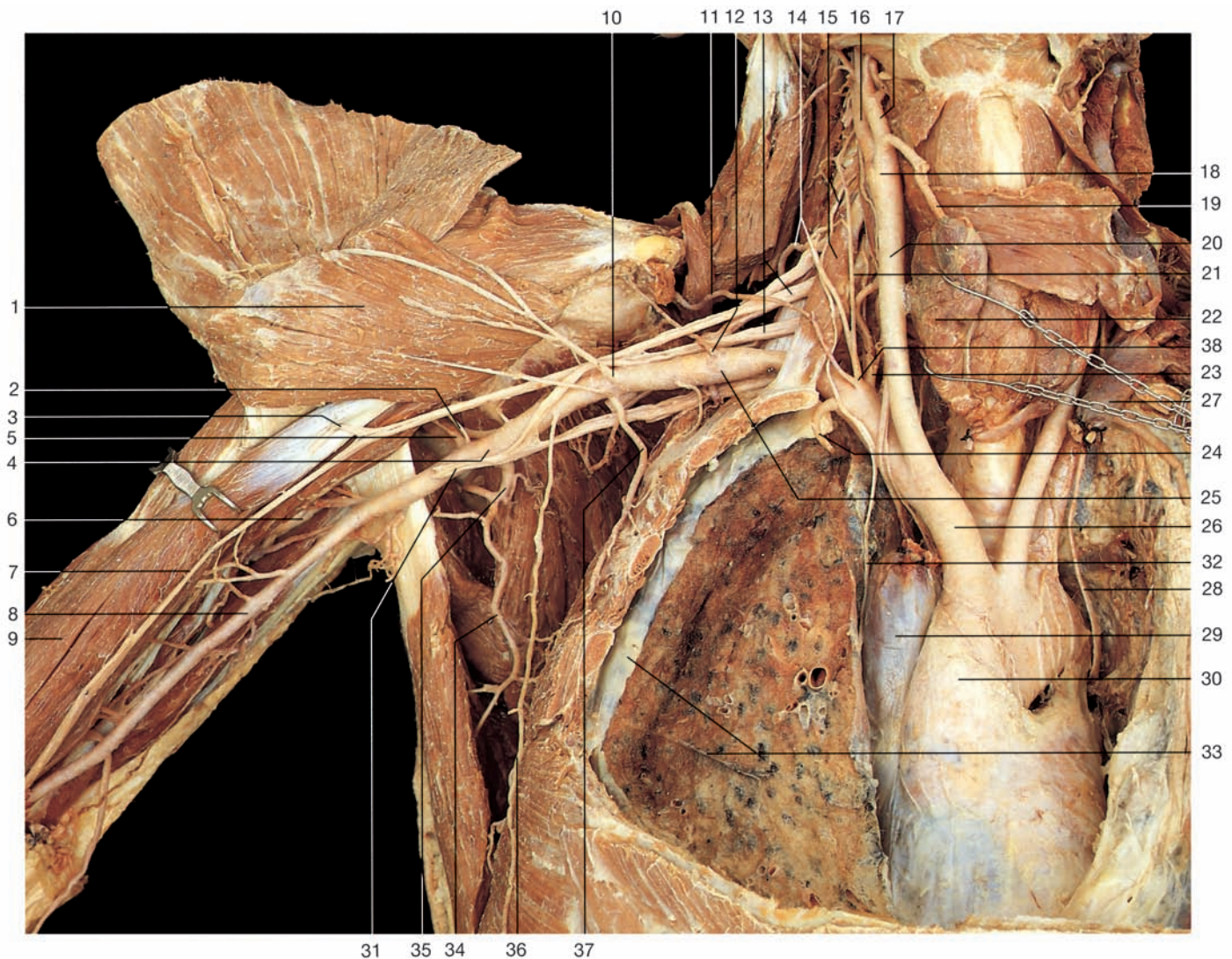
Red = abduction (dorsal interossei, abductor digiti minimi, and abductor pollicis brevis muscles)

Blue = adduction (palmar interossei muscles, adductor pollicis muscle)



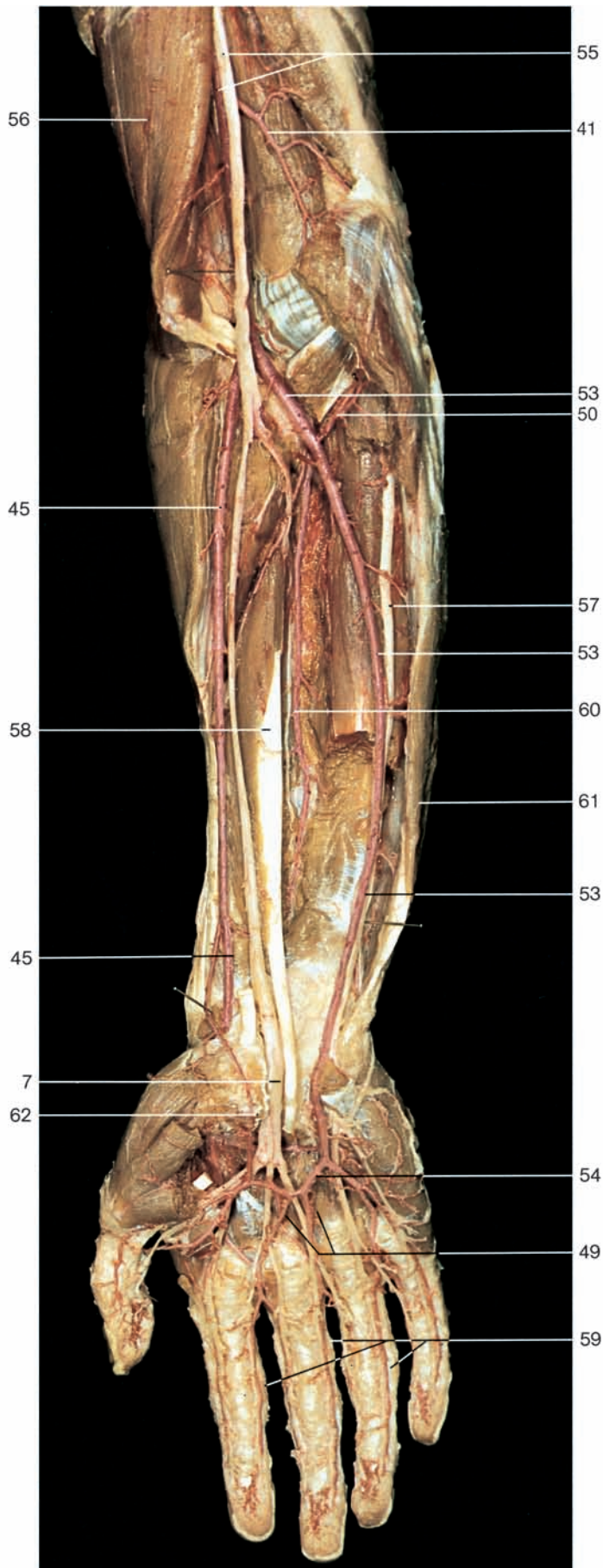
Longitudinal section through the third finger (MRI scan). (Prof. Heuck, Munich, Germany.) Compare with the correspondent drawing.

- 1 Pronator quadratus muscle
- 2 Tendon of flexor carpi radialis muscle
- 3 Abductor pollicis brevis muscle (divided)
- 4 Adductor pollicis muscle (divided)
- 5 Tendon of flexor pollicis longus muscle
- 6 Lumbrical muscles (cut)
- 7 Tendon of flexor carpi ulnaris muscle
- 8 Pisiform bone
- 9 Abductor digiti minimi muscle (divided)
- 10 Dorsal interossei muscles
- 11 Palmar interossei muscles
- 12 Radius
- 13 Ulna
- 14 Flexor retinaculum
- 15 Tendons of flexor digitorum profundus muscle
- 16 Tendons of flexor digitorum superficialis muscle
- 17 Palmar aponeurosis
- 18 Carpometacarpal joint
- 19 Third metacarpal bone
- 20 Metacarpophalangeal joint
- 21 Head of third proximal phalanx
- 22 Proximal interphalangeal joint
- 23 Middle phalanx
- 24 Distal phalanx

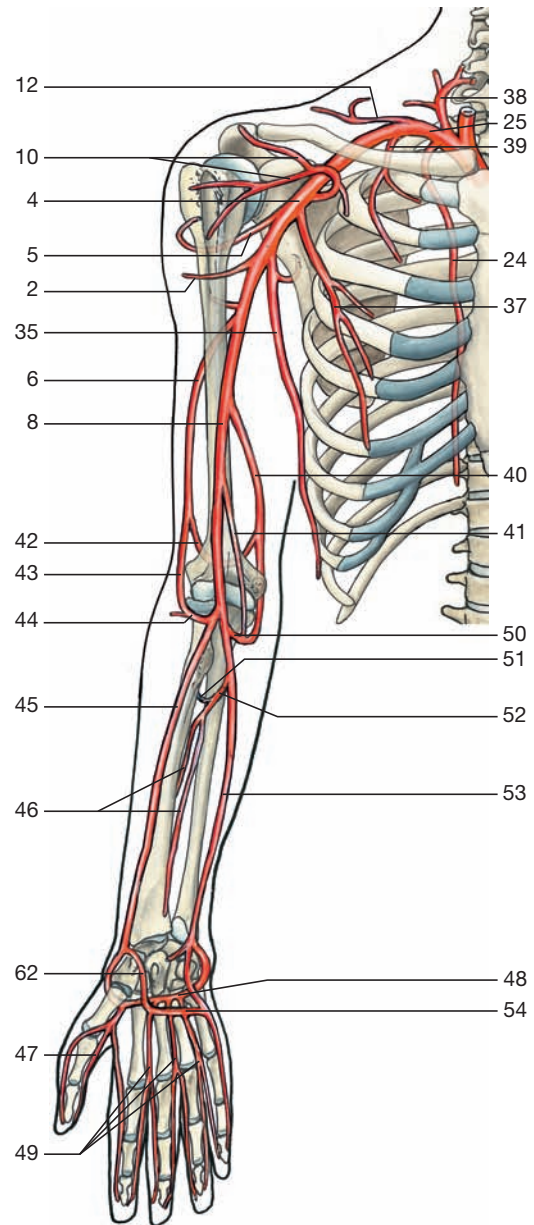


Main branches of subclavian and axillary arteries (right side, anterior aspect). Pectoralis muscles have been reflected, clavicle and anterior wall of thorax removed, and right lung divided. Left lung with pleura and thyroid gland have been reflected laterally to display aortic arch and common carotid artery with their branches.

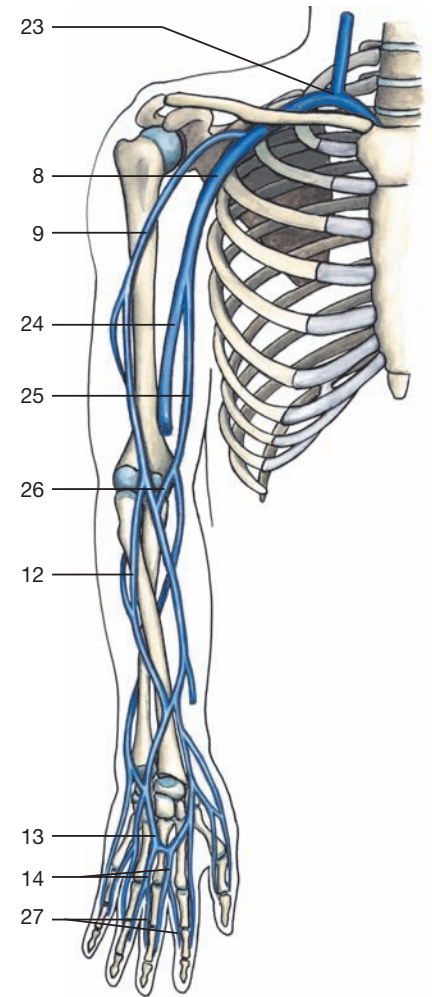
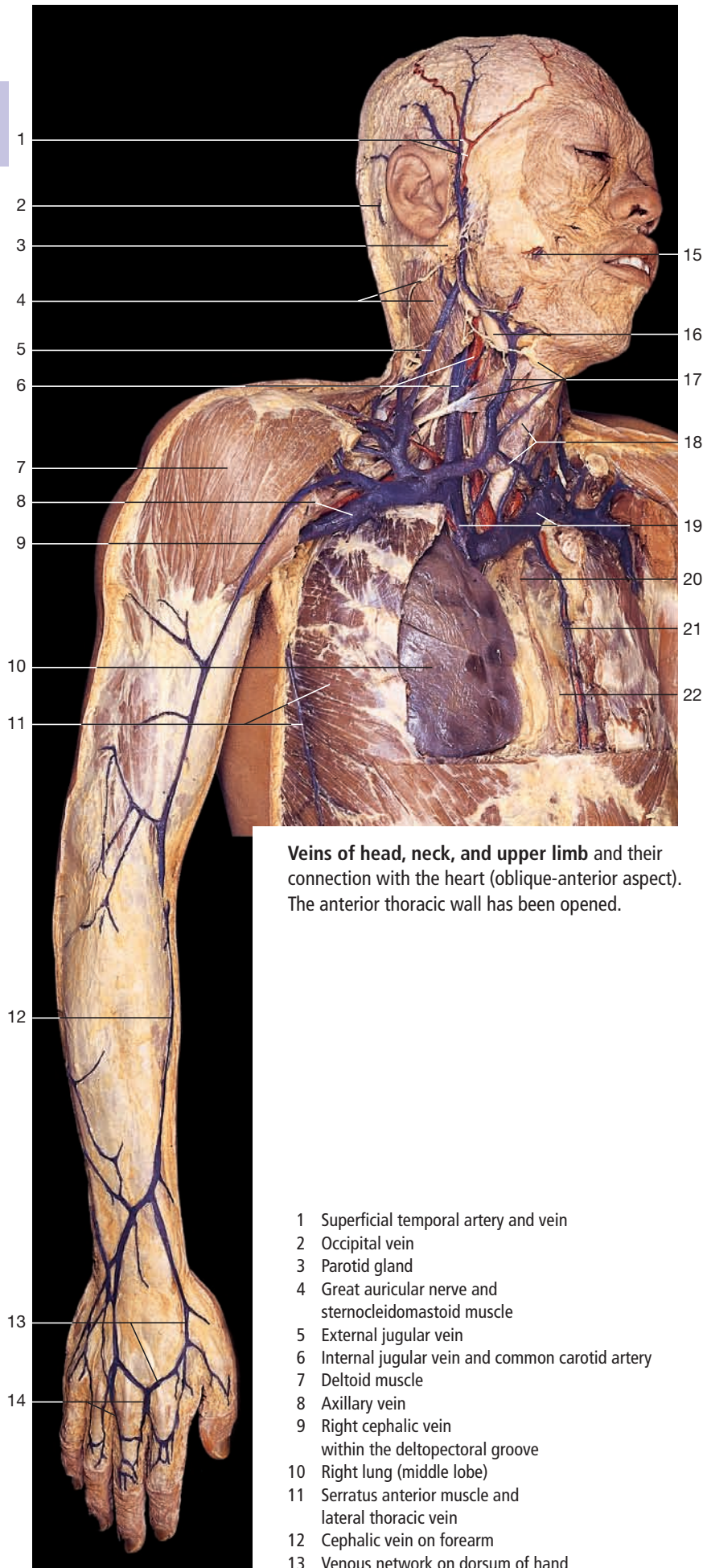
- | | | |
|--|--|---|
| 1 Pectoralis minor muscle (reflected) | 22 Thyroid gland | 43 Radial collateral artery |
| 2 Anterior circumflex humeral artery | 23 Inferior thyroid artery | 44 Radial recurrent artery |
| 3 Musculocutaneous nerve (divided) | 24 Internal thoracic artery | 45 Radial artery |
| 4 Axillary artery | 25 Right subclavian artery | 46 Anterior and posterior interosseous arteries |
| 5 Posterior circumflex humeral artery | 26 Brachiocephalic trunk | 47 Princeps pollicis artery |
| 6 Profunda brachii artery | 27 Left brachiocephalic vein (divided) | 48 Deep palmar arch |
| 7 Median nerve (var.) | 28 Left vagus nerve | 49 Common palmar digital arteries |
| 8 Brachial artery | 29 Superior vena cava (divided) | 50 Ulnar recurrent artery |
| 9 Biceps brachii muscle | 30 Ascending aorta | 51 Recurrent interosseous artery |
| 10 Thoraco-acromial artery | 31 Median nerve (divided) | 52 Common interosseous artery |
| 11 Suprascapular artery | 32 Phrenic nerve | 53 Ulnar artery |
| 12 Descending scapular artery | 33 Right lung (divided) and pulmonary pleura | 54 Superficial palmar arch |
| 13 Brachial plexus (middle trunk) | 34 Thoracodorsal artery | 55 Median nerve and brachial artery |
| 14 Transverse cervical artery | 35 Subscapular artery | 56 Biceps brachii muscle |
| 15 Anterior scalene muscle and phrenic nerve | 36 Lateral mammary branches (var.) | 57 Ulnar nerve |
| 16 Right internal carotid artery | 37 Lateral thoracic artery | 58 Flexor pollicis longus muscle |
| 17 Right external carotid artery | 38 Thyrocervical trunk | 59 Proper palmar digital arteries |
| 18 Carotid sinus | 39 Supreme intercostal artery | 60 Anterior interosseous artery |
| 19 Superior thyroid artery | 40 Superior ulnar collateral artery | 61 Flexor carpi ulnaris muscle |
| 20 Right common carotid artery | 41 Inferior ulnar collateral artery | 62 Superficial palmar branch of radial artery |
| 21 Ascending cervical artery | 42 Middle collateral artery | |



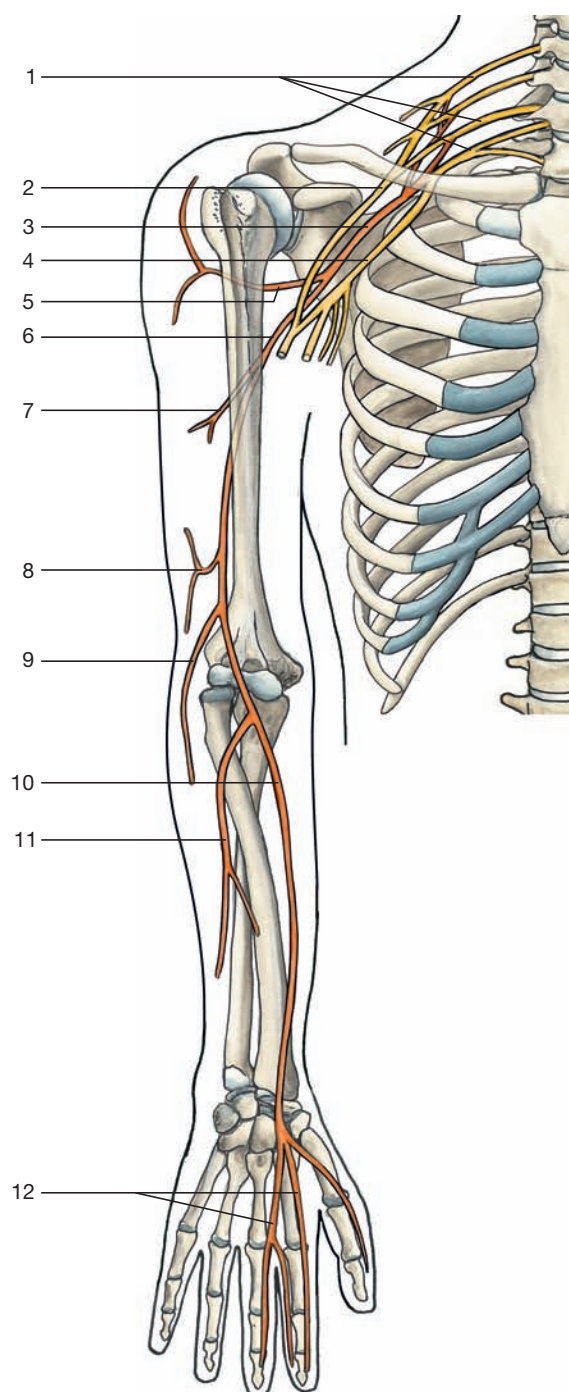
Main arteries of forearm and hand (right side, anterior aspect).
The superficial flexor muscles have been removed, the carpal tunnel opened, and the flexor retinaculum cut. The arteries have been filled with colored resin.



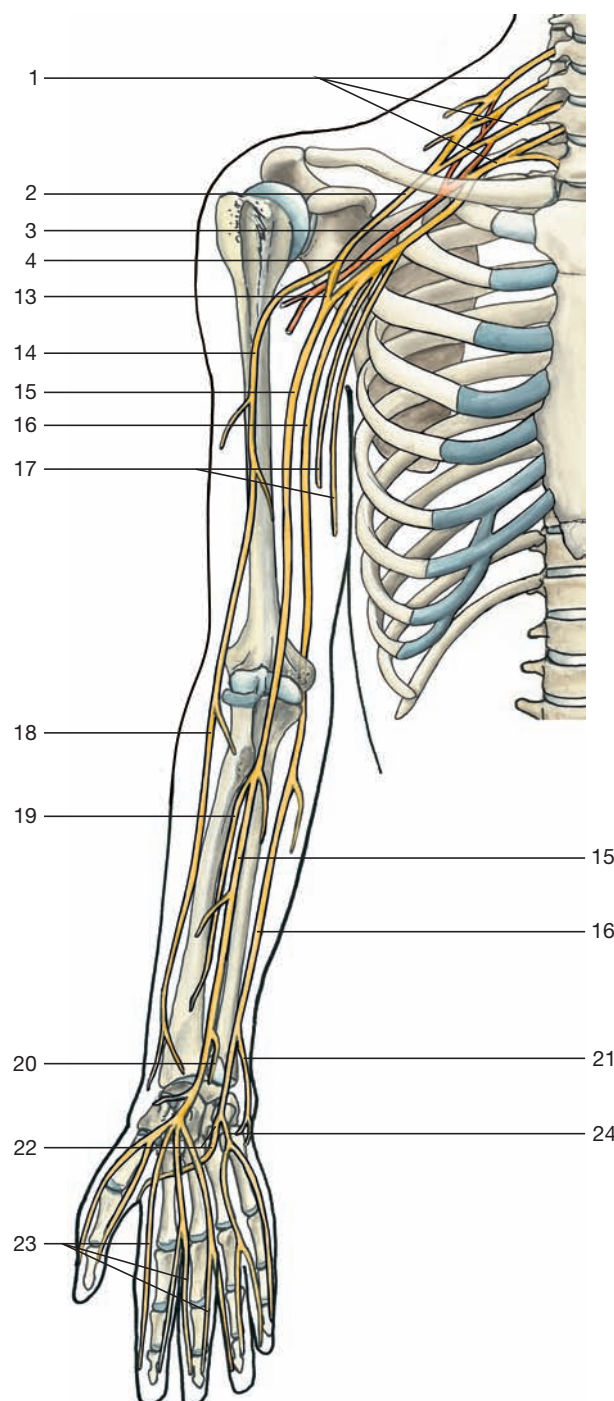
Main arteries of the upper limb (right side).



Main truncal veins of the upper limb (right side).



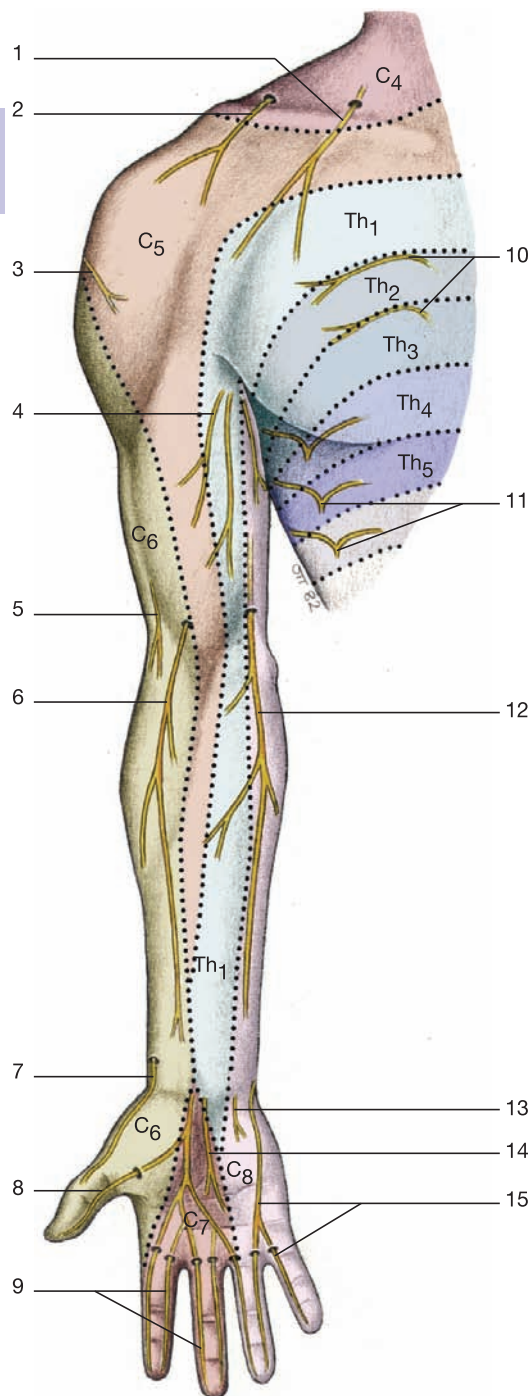
Main branches of radial and axillary nerves (right side). The posterior trunk of brachial plexus is indicated in orange.



Main branches of musculocutaneous, median, and ulnar nerves (right side). The posterior trunk of brachial plexus is indicated in orange.

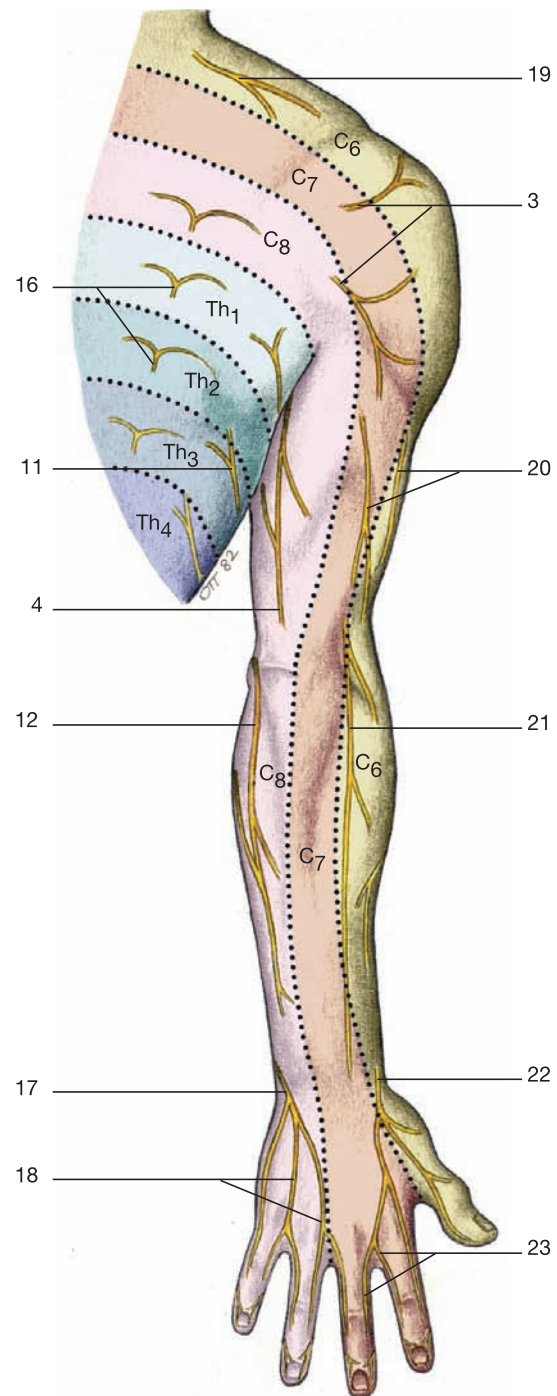
- 1 Brachial plexus
- 2 Lateral cord of brachial plexus
- 3 Posterior cord of brachial plexus
- 4 Medial cord of brachial plexus
- 5 Axillary nerve
- 6 Radial nerve
- 7 Posterior cutaneous nerve of arm
- 8 Lower lateral cutaneous nerve of arm
- 9 Posterior cutaneous nerve of forearm
- 10 Superficial branch of radial nerve
- 11 Deep branch of radial nerve
- 12 Dorsal digital nerves

- 13 Roots of median nerve
- 14 Musculocutaneous nerve
- 15 Median nerve
- 16 Ulnar nerve
- 17 Medial cutaneous nerves of arm and forearm
- 18 Lateral cutaneous nerve of forearm
- 19 Anterior interosseous nerve
- 20 Palmar branch of median nerve
- 21 Dorsal branch of ulnar nerve
- 22 Deep branch of ulnar nerve
- 23 Common palmar digital nerves of median nerve
- 24 Superficial branch of ulnar nerve



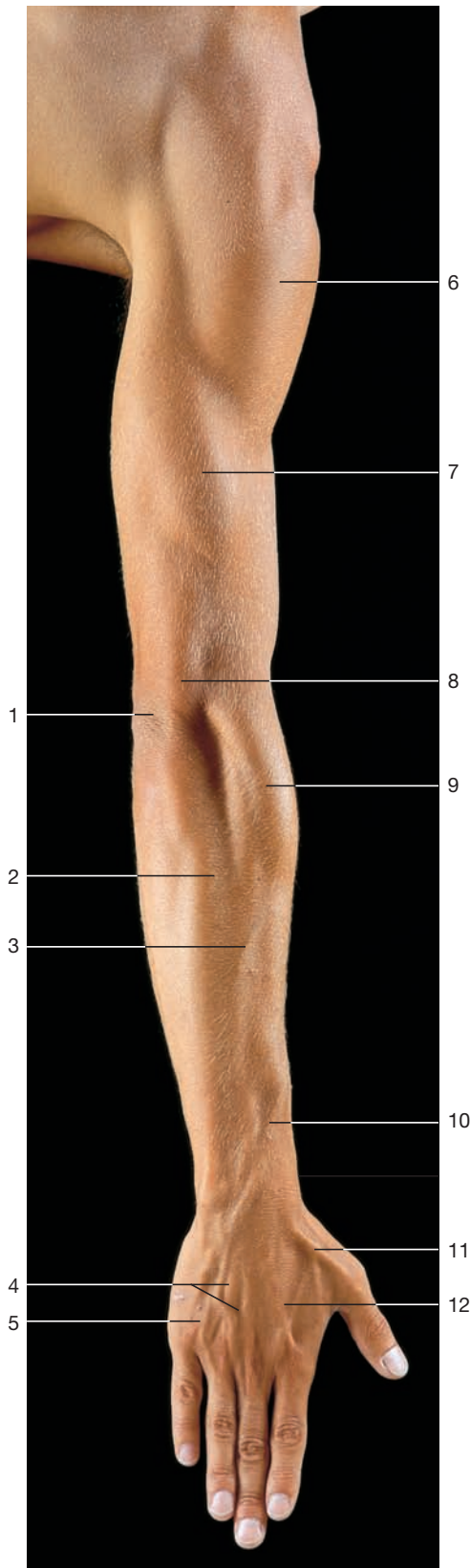
Cutaneous nerves of the upper limb
(right side, anterior aspect).

- 1 Medial supraclavicular nerve
- 2 Intermediate supraclavicular nerve
- 3 Upper lateral cutaneous nerve of arm
- 4 Terminal branches of intercostobrachial nerves
- 5 Lower lateral cutaneous nerve of arm
- 6 Lateral cutaneous nerve of forearm
- 7 Terminal branch of superficial branch of radial nerve
- 8 Palmar digital nerve of thumb (branch of median nerve)
- 9 Palmar digital branches of median nerve
- 10 Anterior cutaneous branches of intercostal nerves
- 11 Lateral cutaneous branches of intercostal nerves
- 12 Medial cutaneous nerve of forearm
- 13 Palmar cutaneous branch of ulnar nerve
- 14 Palmar branch of median nerve
- 15 Palmar digital branches of ulnar nerve



Cutaneous nerves of the upper limb
(right side, posterior aspect).

- 16 Cutaneous branches of dorsal rami of spinal nerves
 - 17 Dorsal branch of ulnar nerve
 - 18 Dorsal digital nerves
 - 19 Posterior supraclavicular nerve
 - 20 Posterior cutaneous nerve of arm
 - 21 Posterior cutaneous nerve of forearm
 - 22 Superficial branch
 - 23 Dorsal digital branches
- } from radial nerve

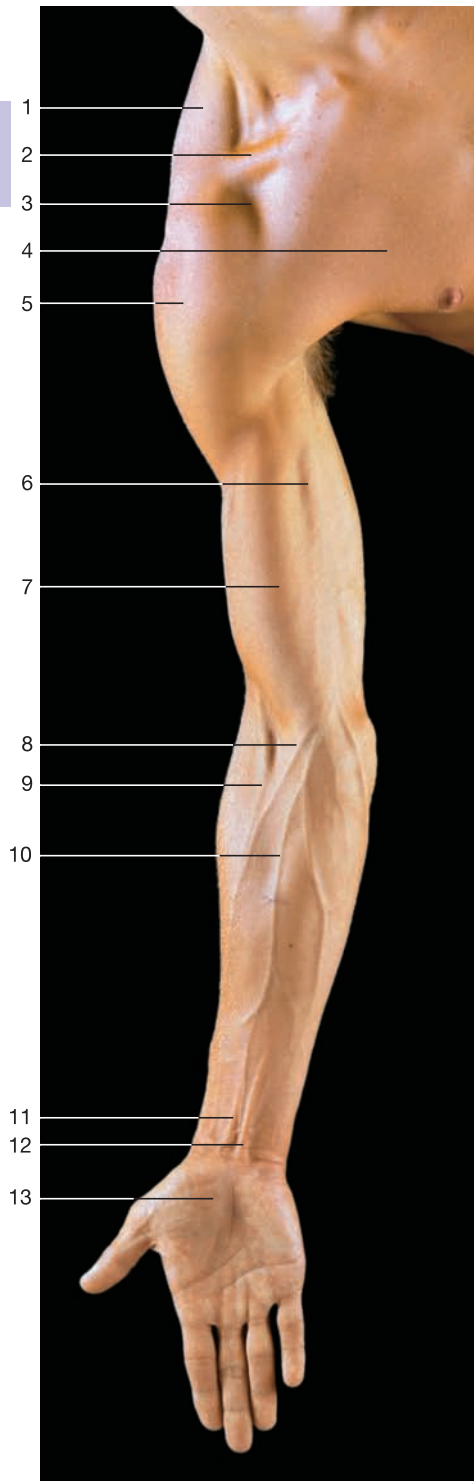


Surface anatomy of the upper limb
(right side, posterior aspect).

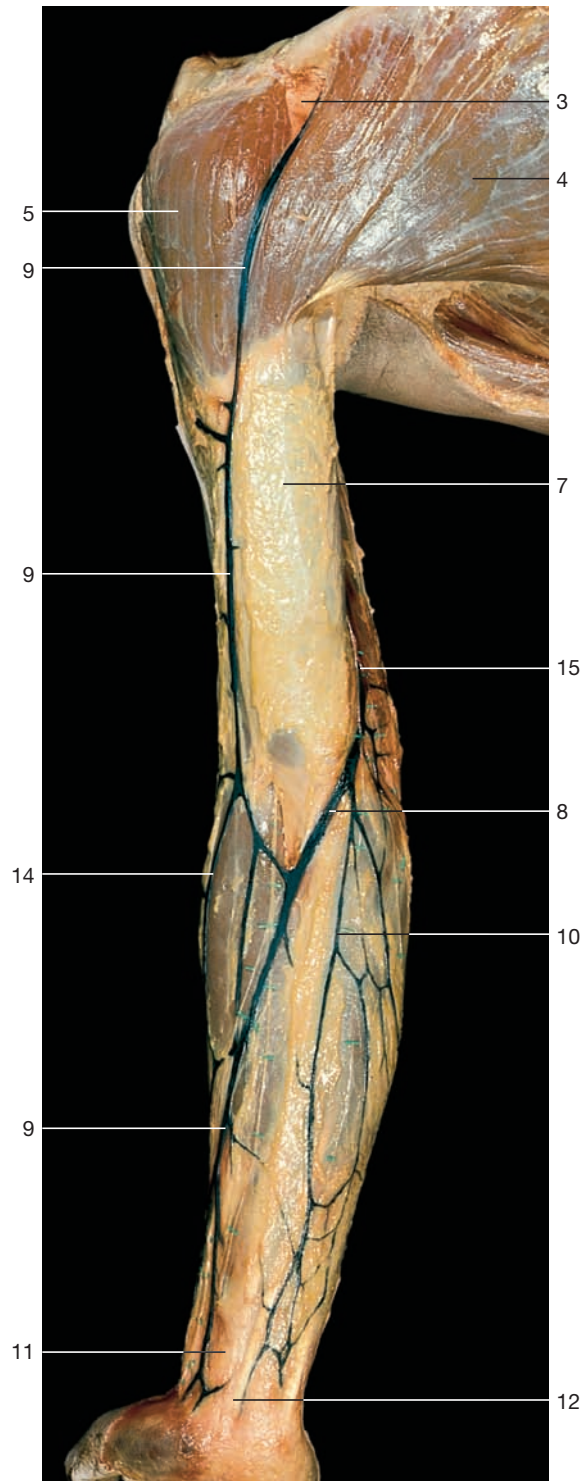


Surface anatomy of the arm (right side, lateral aspect).
The triceps brachii muscle is strongly contracted.

- | | |
|--|--|
| 1 Olecranon | 11 Tendon of abductor pollicis longus muscle |
| 2 Extensor muscles of forearm | 12 Tendon of extensor indicis muscle |
| 3 Accessory cephalic vein | 13 Sternocleidomastoid muscle |
| 4 Tendons of extensor digitorum muscle | 14 Clavicle |
| 5 Dorsal venous network of hand | 15 Lateral head of triceps brachii muscle |
| 6 Deltoid muscle | 16 Medial head of triceps brachii muscle |
| 7 Triceps brachii muscle | 17 Tendon of triceps brachii muscle |
| 8 Lateral epicondyle of humerus | |
| 9 Brachioradialis muscle | |
| 10 Cephalic vein | |



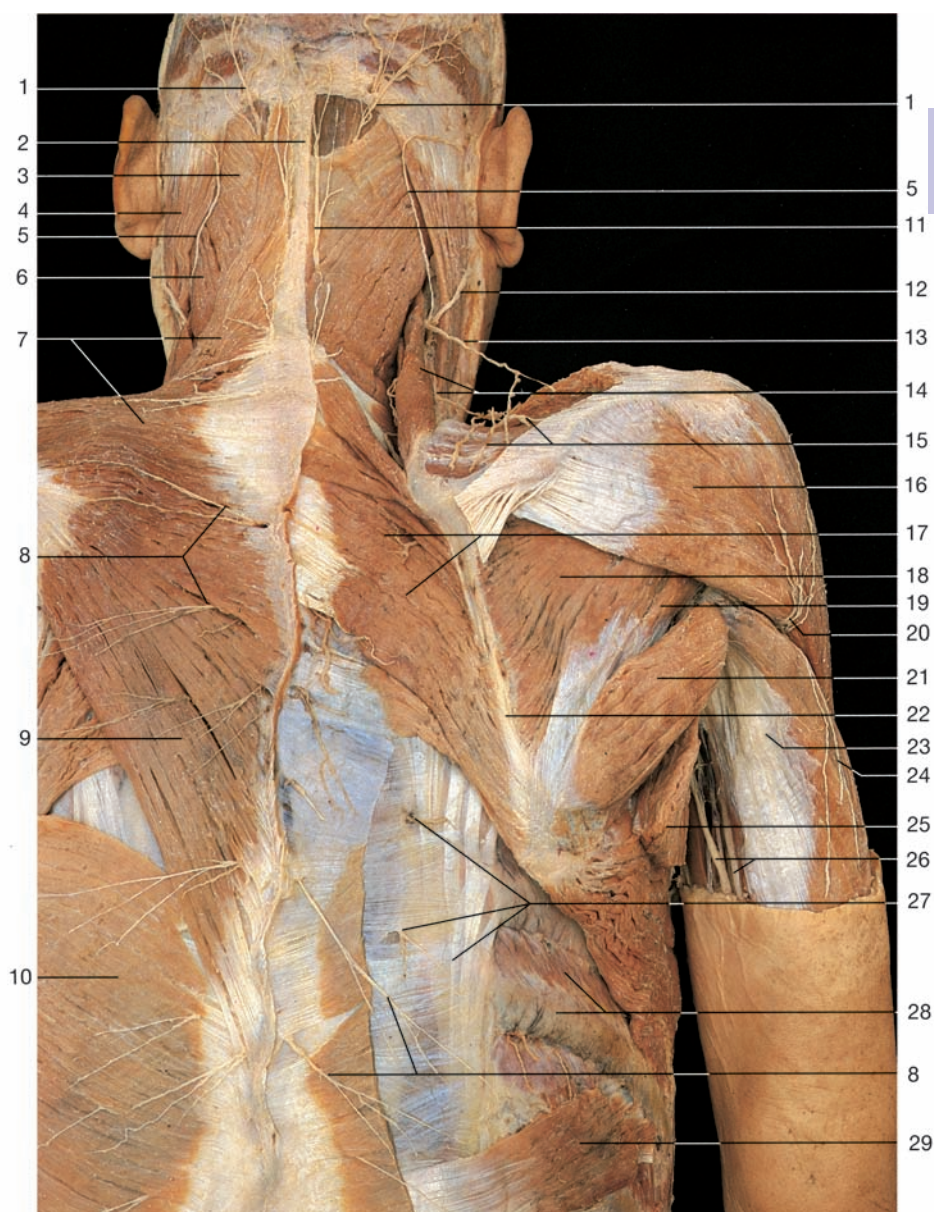
Surface anatomy of the upper limb
(right side, anterior aspect).



Superficial veins of the arm (right side, anterior aspect). The veins have been injected with blue gelatin.

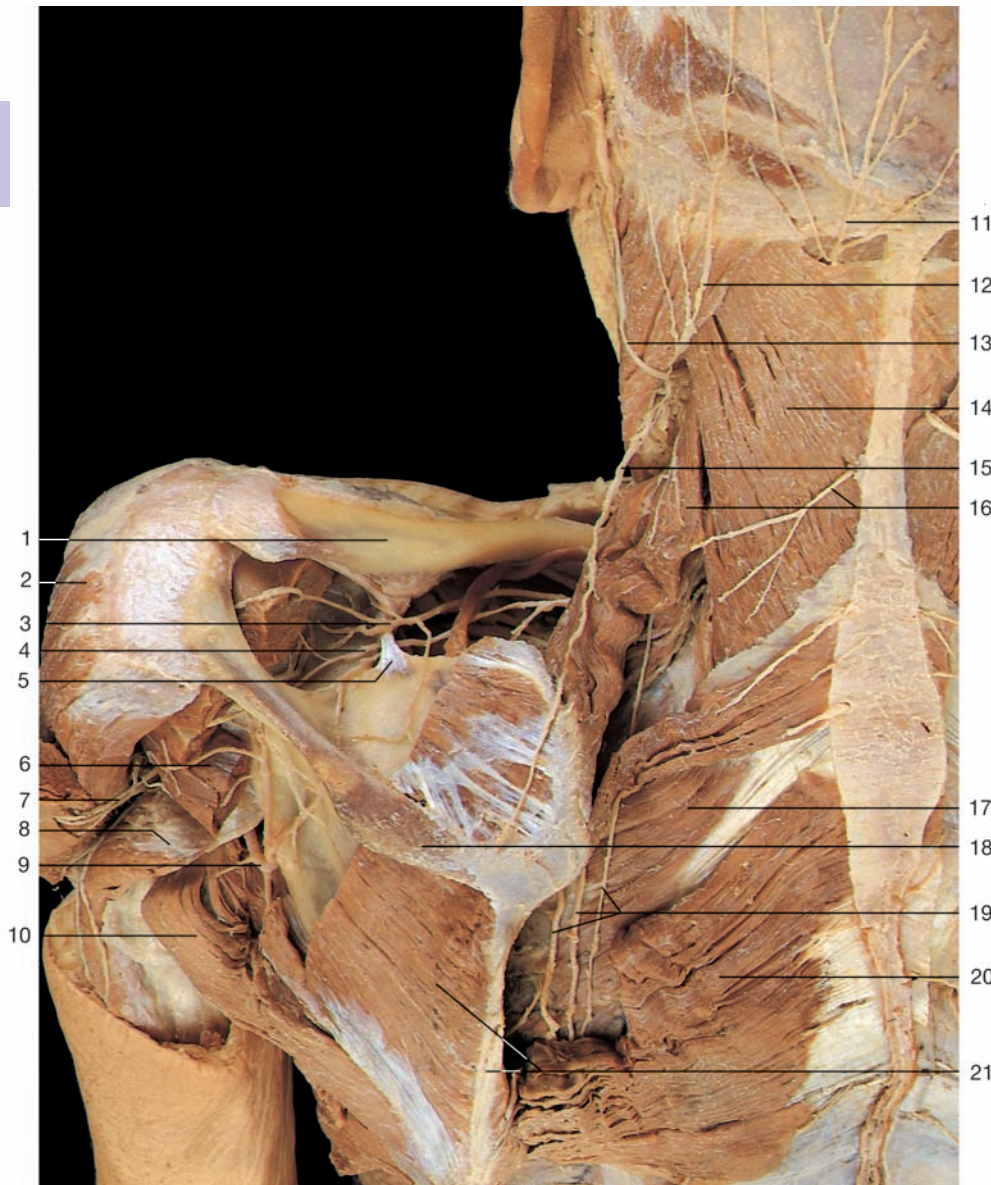
- 1 Trapezius muscle
- 2 Clavicle
- 3 Deltopectoral triangle
- 4 Pectoralis major muscle
- 5 Deltoid muscle
- 6 Brachial vein
- 7 Biceps brachii muscle

- 8 Median cubital vein
- 9 Cephalic vein
- 10 Median vein of forearm
- 11 Tendon of flexor carpi radialis
- 12 Tendon of palmaris longus muscle
- 13 Location of adductor pollicis muscle
- 14 Accessory cephalic vein
- 15 Basilic vein



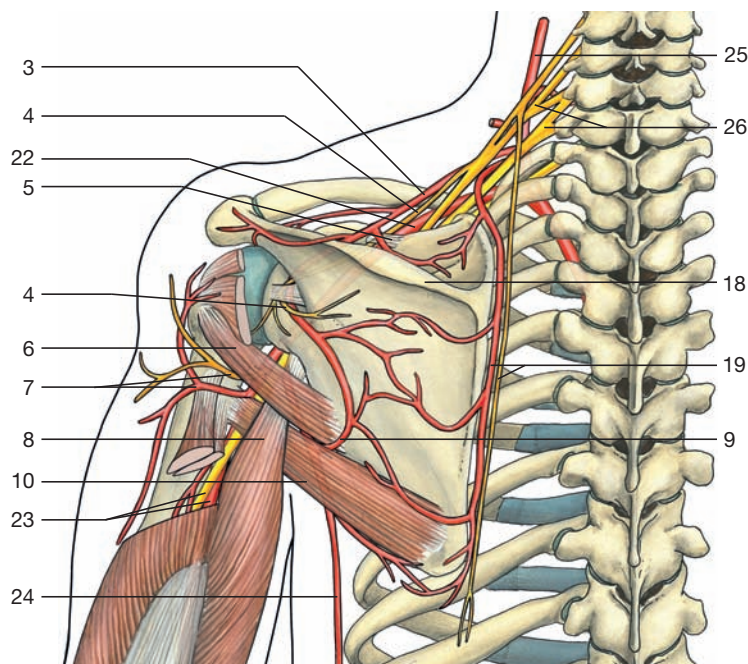
Posterior regions of neck and shoulder (left side: superficial layer; right side: trapezius and latissimus dorsi muscles have been removed). Dissection of dorsal branches of spinal nerves.

- | | |
|--|--|
| 1 Greater occipital nerve | 16 Deltoid muscle |
| 2 Ligamentum nuchae | 17 Rhomboid major muscle |
| 3 Splenius capitis muscle | 18 Infraspinatus muscle |
| 4 Sternocleidomastoid muscle | 19 Teres minor muscle |
| 5 Lesser occipital nerve | 20 Upper lateral cutaneous nerve of arm (branch of axillary nerve) |
| 6 Splenius cervicis muscle | 21 Teres major muscle |
| 7 Descending and transverse fibers of trapezius muscle | 22 Medial margin of scapula |
| 8 Medial cutaneous branches of dorsal rami of spinal nerves | 23 Long head of triceps muscle |
| 9 Ascending fibers of trapezius muscle | 24 Posterior cutaneous nerve of arm (branch of radial nerve) |
| 10 Latissimus dorsi muscle | 25 Latissimus dorsi muscle (divided) |
| 11 Cutaneous branch of third occipital nerve | 26 Ulnar nerve and brachial artery |
| 12 Great auricular nerve | 27 Lateral cutaneous branches of dorsal rami of spinal nerves and iliocostalis thoracis muscle |
| 13 Accessory nerve (n. XI) | 28 External intercostal muscle and seventh rib |
| 14 Posterior supraclavicular nerve and levator scapulae muscle | 29 Serratus posterior inferior muscle |
| 15 Branches of suprascapular artery | |

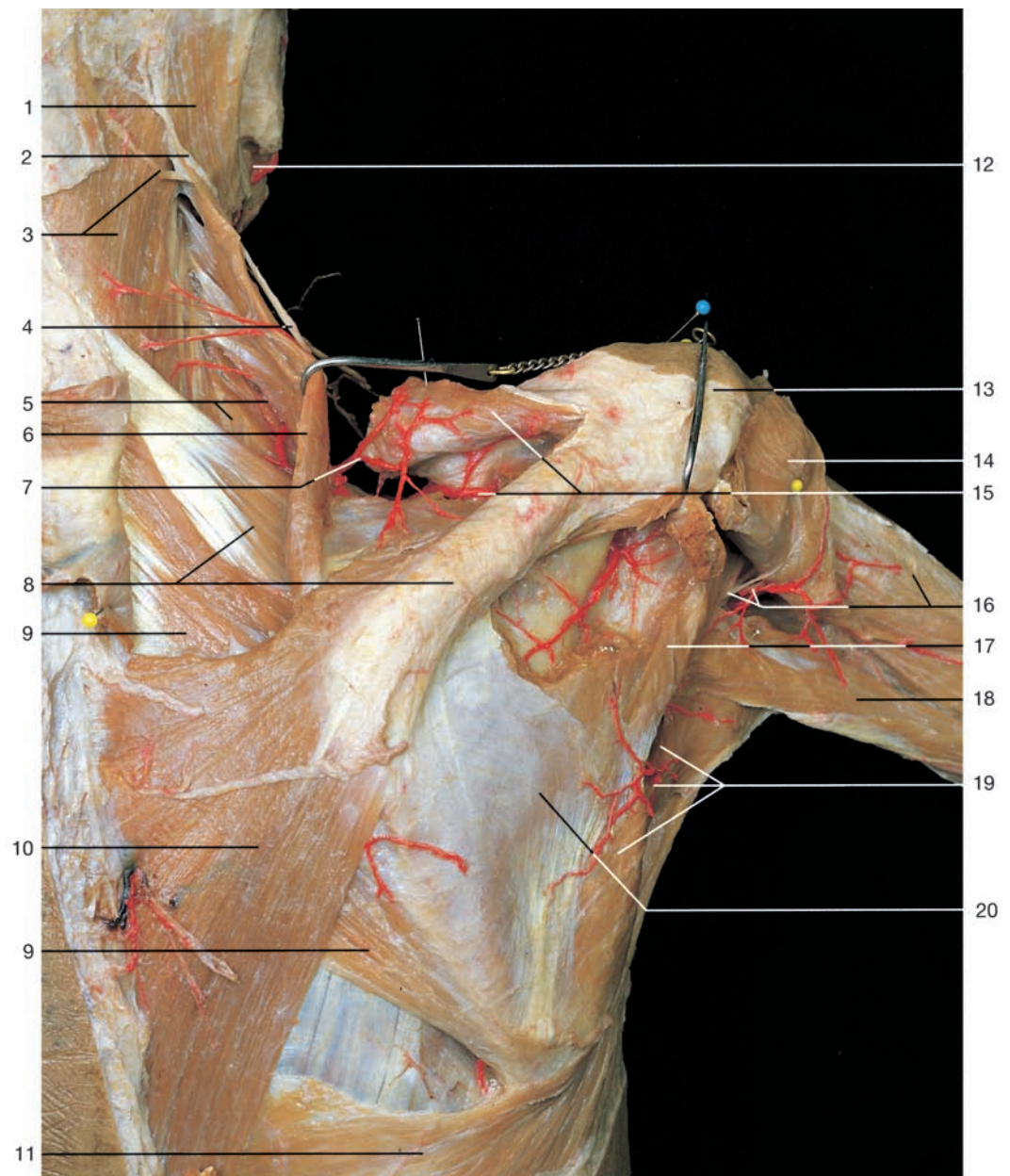


- 1 Clavicle
- 2 Deltoid muscle
- 3 Suprascapular artery
- 4 Suprascapular nerve
- 5 Superior transverse scapular ligament
- 6 Teres minor muscle
- 7 Axillary nerve and posterior circumflex humeral artery
- 8 Long head of triceps muscle
- 9 Circumflex scapular artery
- 10 Teres major muscle
- 11 Greater occipital nerve
- 12 Lesser occipital nerve
- 13 Great auricular nerve
- 14 Splenius capitis muscle
- 15 Accessory nerve (n. XI)
- 16 Third occipital nerve and levator scapulae muscle
- 17 Serratus posterior superior muscle
- 18 Spine of scapula
- 19 Descending scapular artery and dorsal scapular nerve
- 20 Rhomboid major muscle
- 21 Infraspinatus muscle and medial margin of scapula
- 22 Axillary artery
- 23 Radial nerve and brachial artery
- 24 Thoracodorsal artery
- 25 Thyrocervical trunk
- 26 Brachial plexus

Posterior region of the shoulder, deepest layer. Rhomboid and scapular muscles have been fenestrated, the posterior part of deltoid muscle has been reflected.

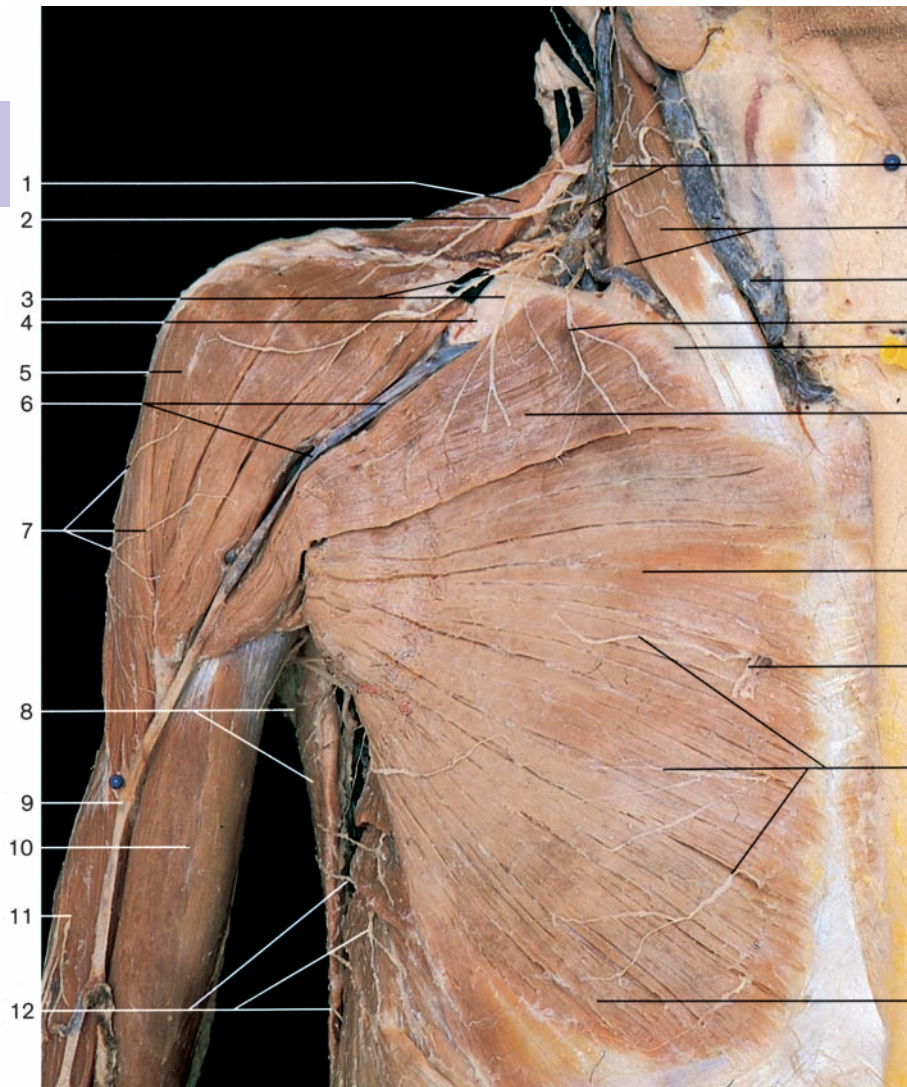


Collateral circulation of the shoulder (posterior aspect). Anastomosis of suprascapular and circumflex scapular arteries.



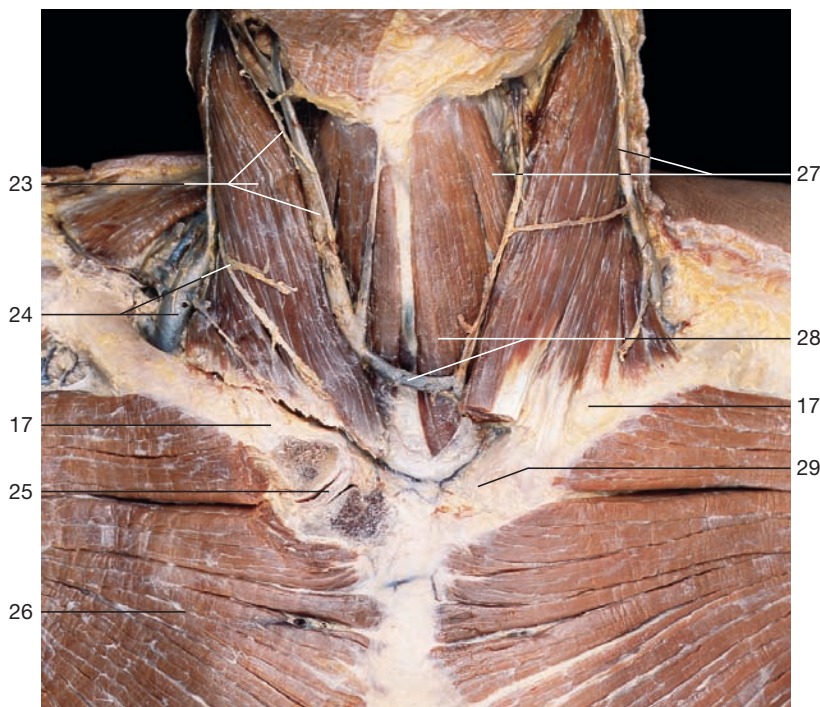
Posterior region of the shoulder, deep layer. The arteries of the scapular region have been injected with red gelatin. Trapezius, deltoid, and infraspinatus muscles have been partially removed or reflected.

- | | |
|---|--|
| 1 Sternocleidomastoid muscle | 10 Trapezius muscle |
| 2 Lesser occipital nerve | 11 Latissimus dorsi muscle |
| 3 Splenius capitis muscle and third occipital nerve | 12 Facial artery |
| 4 Accessory nerve (n. XI) | 13 Acromion |
| 5 Splenius cervicis muscle and transverse cervical artery (deep branch) | 14 Deltoid muscle |
| 6 Levator scapulae muscle | 15 Suprascapular artery and supraspinatus muscle (reflected) |
| 7 Transverse cervical artery (superficial branch) | 16 Axillary nerve, posterior circumflex humeral artery, and lateral head of triceps brachii muscle |
| 8 Spine of scapula and serratus posterior superior muscle | 17 Teres minor muscle |
| 9 Rhomboid major muscle | 18 Long head of triceps brachii muscle |
| | 19 Circumflex scapular artery and teres major muscle |
| | 20 Infraspinatus muscle |

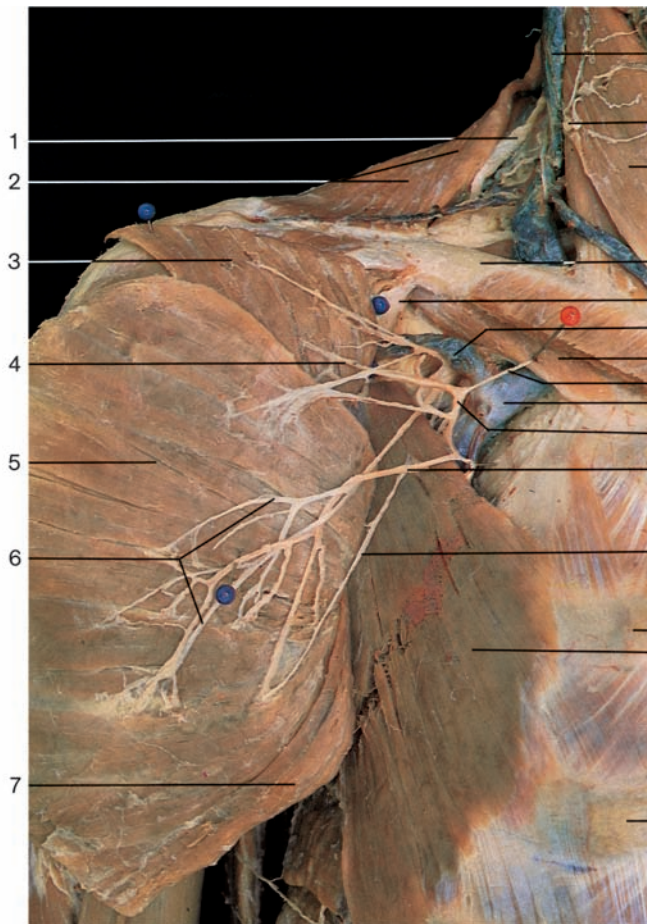


Anterior regions of shoulder and thoracic wall, superficial layer. Dissection of the cutaneous nerves and veins.

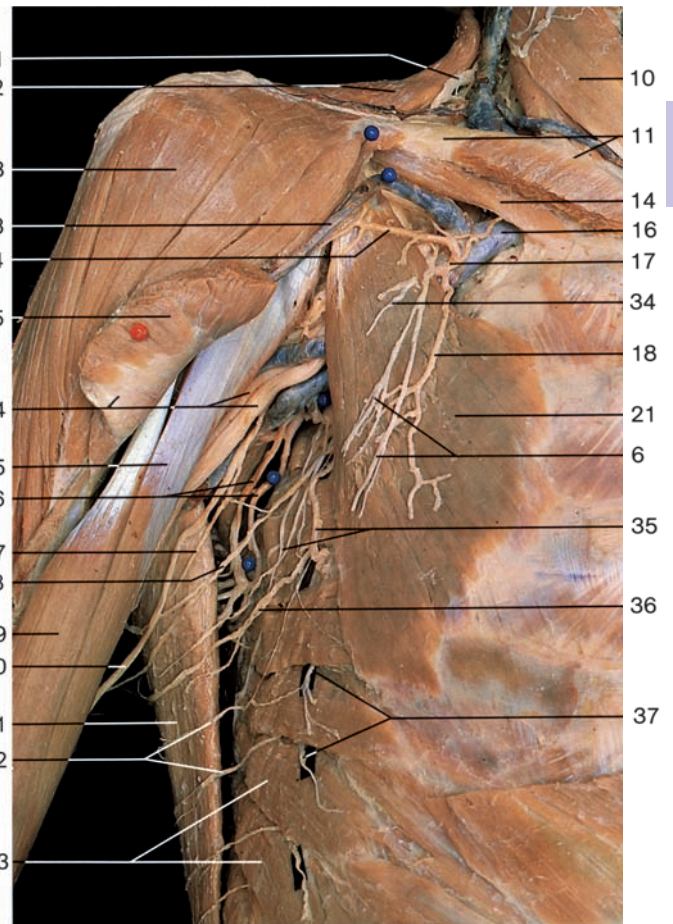
- 1 Trapezius muscle
- 2 Posterior supraclavicular nerve
- 3 Middle supraclavicular nerve
- 4 Deltopectoral triangle
- 5 Deltoid muscle
- 6 Cephalic vein within the deltopectoral groove
- 7 Upper lateral cutaneous nerve of arm (branch of axillary nerve)
- 8 Latissimus dorsi muscle
- 9 Cephalic vein
- 10 Biceps brachii muscle
- 11 Triceps brachii muscle
- 12 Lateral cutaneous branches of intercostal nerves
- 13 Transverse cervical nerve and external jugular vein
- 14 Sternocleidomastoid muscle
- 15 Anterior jugular vein
- 16 Anterior supraclavicular nerve
- 17 Clavicle
- 18 Clavicular part of pectoralis major muscle
- 19 Sternocostal part of pectoralis major muscle
- 20 Perforating branch of internal thoracic artery
- 21 Anterior cutaneous branches of intercostal nerves
- 22 Abdominal part of pectoralis major muscle
- 23 Sternocleidomastoid muscle, cervical branch of facial nerve, and anterior jugular vein
- 24 External jugular vein and transverse cervical nerve (inferior branch)
- 25 Sternoclavicular joint (opened) with articular disc
- 26 Pectoralis major muscle
- 27 Omohyoid muscle and external jugular vein
- 28 Jugular venous arch and sternohyoid muscle
- 29 Sternoclavicular joint (not opened)



Anterior regions of thoracic wall and neck. The sternoclavicular joint is depicted. On the right side the joint has been opened by a coronal section. Note the articular disc.



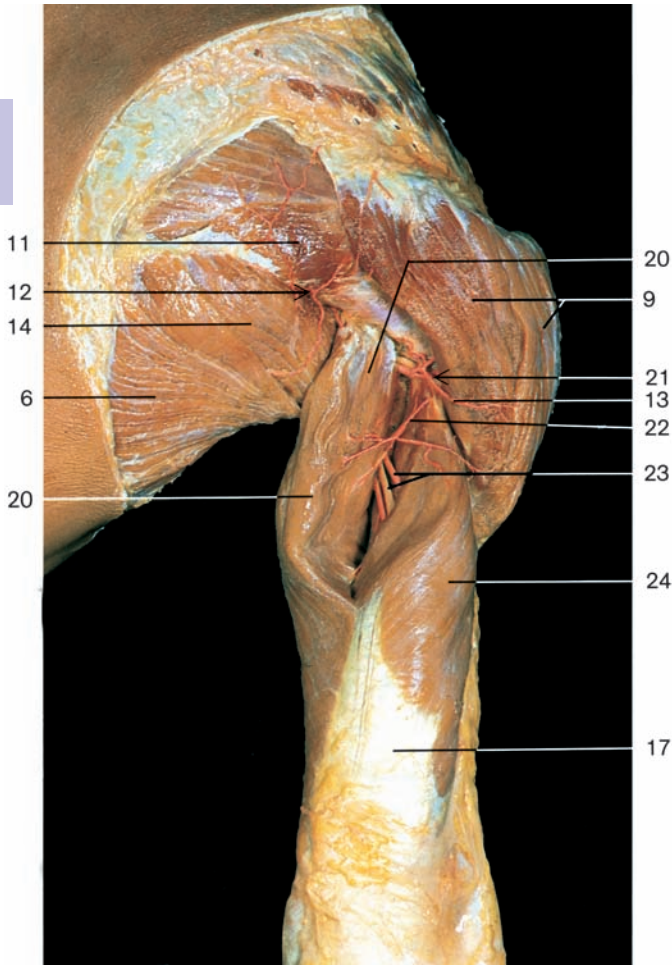
Deltopectoral triangle and infraclavicular region (anterior aspect). The pectoralis major muscle has been cut and reflected.



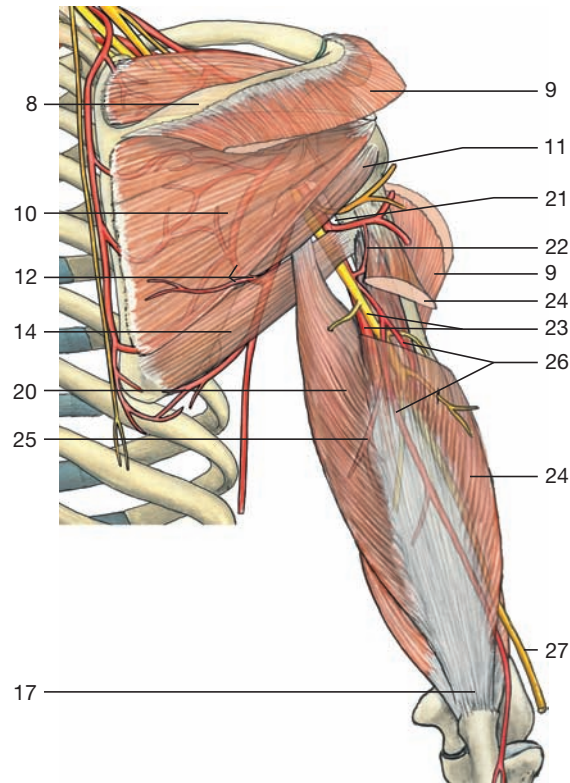
Anterior regions of shoulder and thoracic wall with axillary region, deep layer. The pectoralis major muscle has been cut and partly removed.

- 1 Accessory nerve
- 2 Trapezius muscle
- 3 Pectoralis major muscle (clavicular part)
- 4 Acromial branch of thoraco-acromial artery
- 5 Pectoralis major muscle
- 6 Lateral pectoral nerves
- 7 Abdominal part of pectoralis major muscle
- 8 External jugular vein
- 9 Cutaneous branches of cervical plexus
- 10 Sternocleidomastoid muscle
- 11 Clavicle
- 12 Clavipectoral fascia
- 13 Cephalic vein
- 14 Subclavius muscle
- 15 Clavicular branch of thoraco-acromial artery
- 16 Subclavian vein
- 17 Thoraco-acromial artery
- 18 Pectoral branch of thoraco-acromial artery
- 19 Medial pectoral nerve
- 20 Second rib

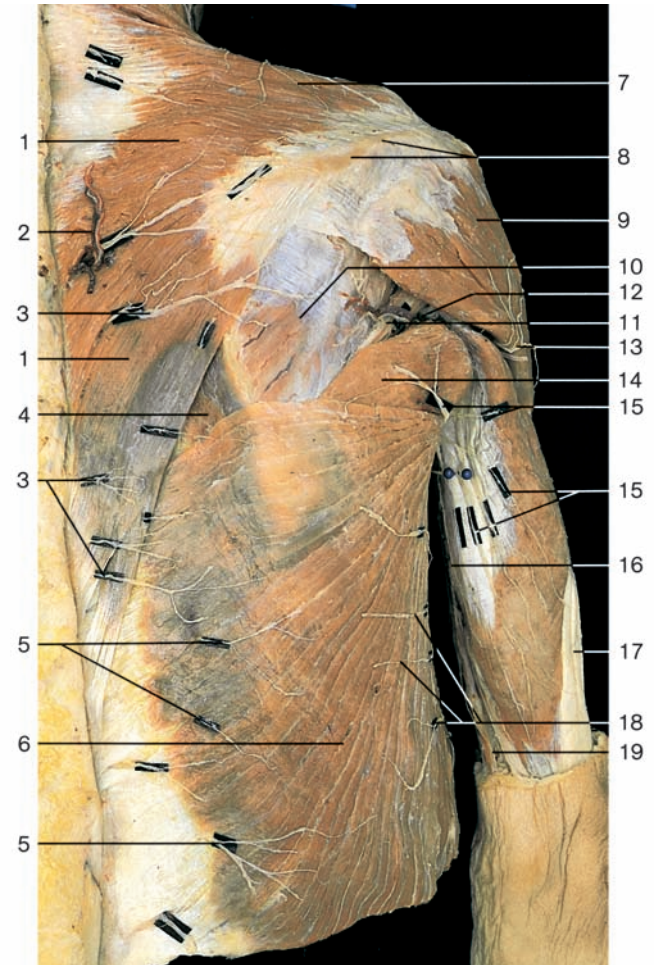
- 21 Pectoralis minor muscle
- 22 Third rib
- 23 Deltoid muscle
- 24 Pectoralis major muscle (reflected), brachial artery, and median nerve
- 25 Short head of biceps brachii muscle
- 26 Thoracodorsal artery and nerve
- 27 Medial cutaneous nerve of arm
- 28 Intercostobrachial nerve (Th₂)
- 29 Long head of biceps brachii muscle
- 30 Medial cutaneous nerve of forearm
- 31 Latissimus dorsi muscle
- 32 Lateral cutaneous branches of intercostal nerves (posterior branches)
- 33 Serratus anterior muscle
- 34 Medial pectoral nerve
- 35 Long thoracic nerve and lateral thoracic artery
- 36 Intercostobrachial nerve (Th₃)
- 37 Lateral cutaneous branches of intercostal nerves (anterior branches)



Shoulder and arm (posterior aspect). Dissection of the quadrangular and triangular spaces of the axillary region.



Course of vessels and nerves at the shoulder region and arm (posterior aspect).

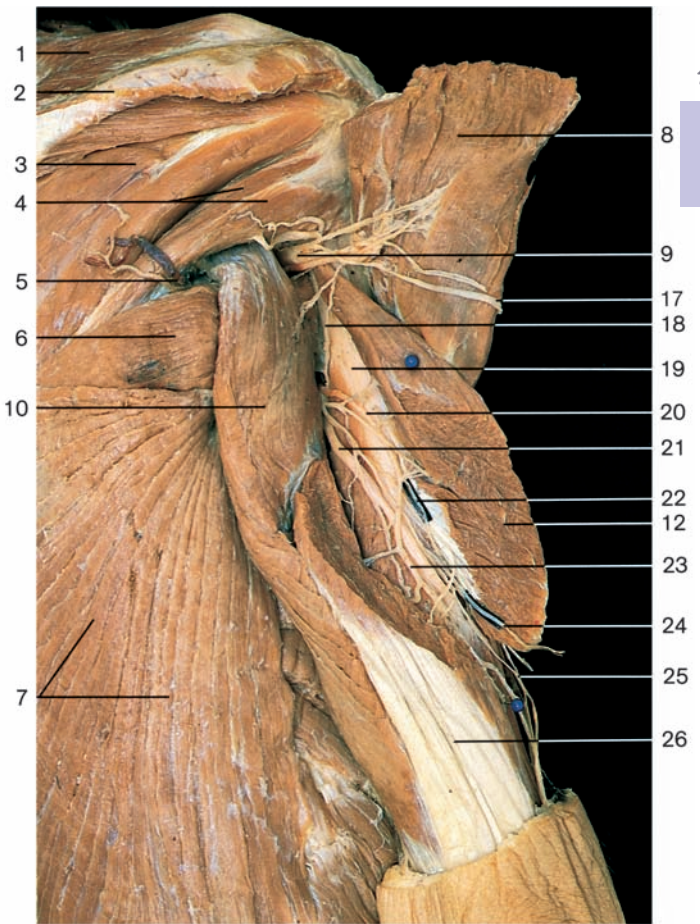


Shoulder region and arm, superficial layer (posterior aspect). Note the segmental arrangement of the cutaneous nerves of the back.

- 1 Trapezius muscle
- 2 Dorsal branches of posterior intercostal artery and vein (medial cutaneous branches)
- 3 Medial branches of dorsal rami of spinal nerves
- 4 Rhomboid major muscle
- 5 Lateral branches of dorsal rami of spinal nerves
- 6 Latissimus dorsi muscle
- 7 Posterior supraclavicular nerves
- 8 Spine of scapula
- 9 Deltoid muscle
- 10 Infraspinatus muscle
- 11 Teres minor muscle
- 12 Triangular space with circumflex scapular artery and vein
- 13 Upper lateral cutaneous nerve of arm with artery
- 14 Teres major muscle
- 15 Terminal branches of intercostobrachial nerve
- 16 Medial cutaneous nerve of arm
- 17 Tendon of triceps brachii muscle
- 18 Lateral cutaneous branches of intercostal nerves
- 19 Medial cutaneous nerve of forearm
- 20 Long head of triceps brachii muscle
- 21 Quadrangular space with axillary nerve and posterior humeral circumflex artery
- 22 Anastomosis between profunda brachii artery and posterior humeral circumflex artery
- 23 Course of radial nerve and profunda brachii artery
- 24 Lateral head of triceps brachii muscle
- 25 Medial collateral artery
- 26 Radial collateral artery
- 27 Radial nerve



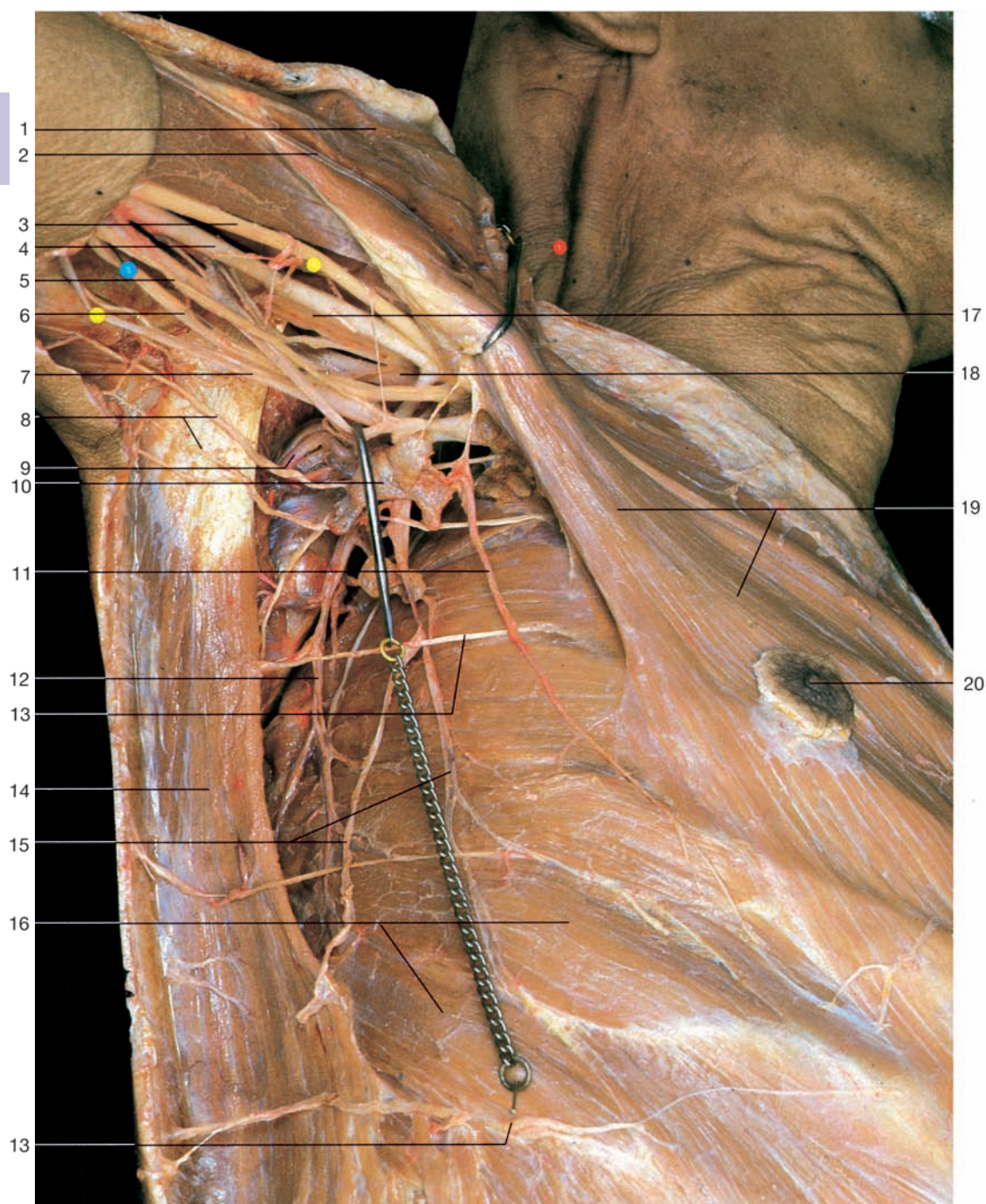
Shoulder region and arm, deep layer (posterior aspect). Part of deltoid muscle has been cut and reflected to display the quadrangular and triangular spaces of the axillary region.



Shoulder region and arm, deep layer (posterior aspect). The lateral head of the triceps brachii muscle has been cut to display the radial nerve and accompanying vessels.

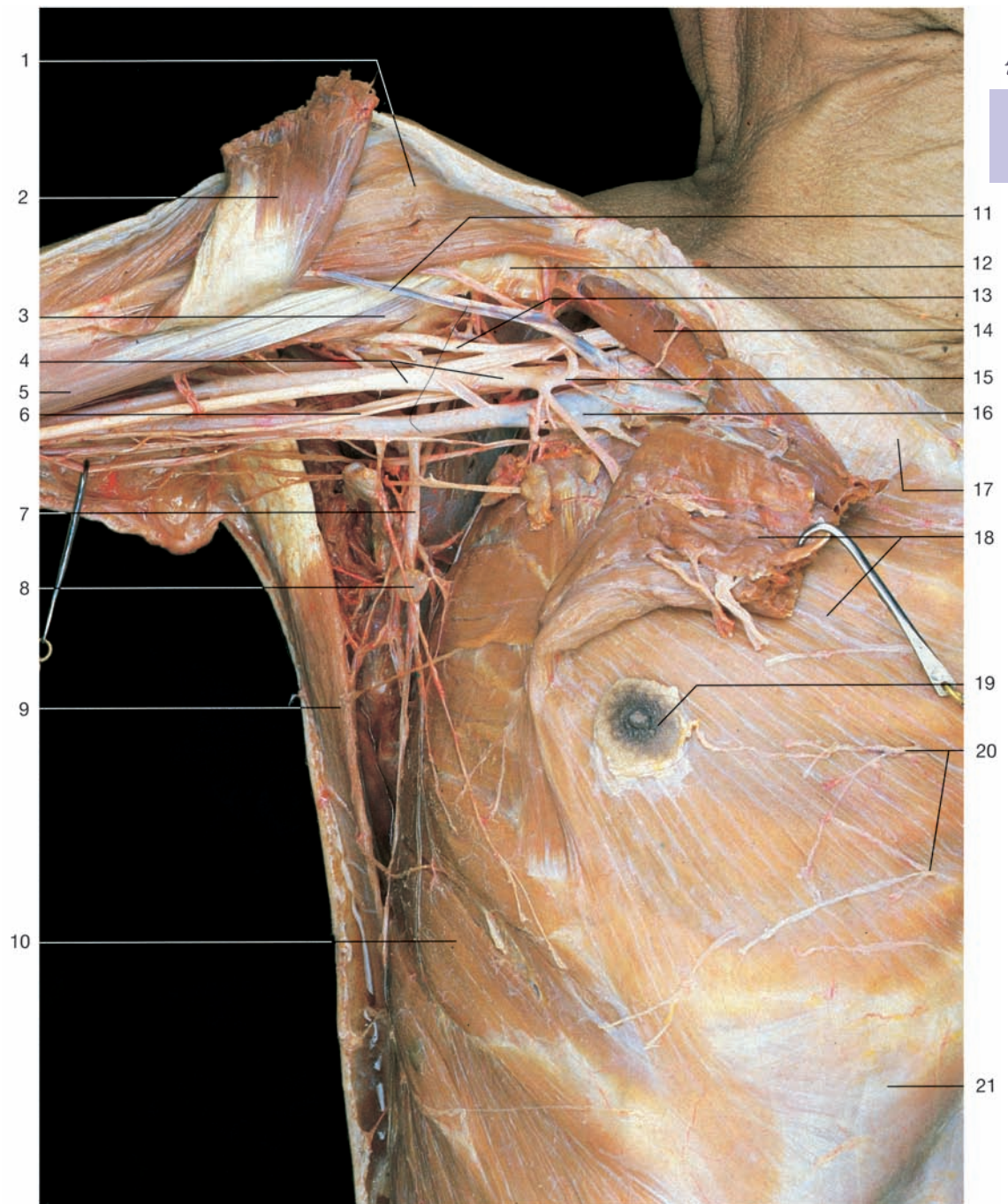
- 1 Trapezius muscle
- 2 Spine of scapula
- 3 Infraspinatus muscle
- 4 Teres minor muscle
- 5 Triangular space containing circumflex scapular artery and vein
- 6 Teres major muscle
- 7 Latissimus dorsi muscle
- 8 Deltoid muscle (cut and reflected)
- 9 Quadrangular space containing axillary nerve and posterior circumflex humeral artery and vein
- 10 Long head of triceps brachii muscle
- 11 Cutaneous branch of axillary nerve
- 12 Lateral head of triceps brachii muscle
- 13 Terminal branches of intercostobrachial nerve

- 14 Lateral cutaneous branches of intercostal nerves
- 15 Medial cutaneous nerve of arm
- 16 Medial cutaneous nerve of forearm
- 17 Upper lateral cutaneous nerve of arm
- 18 Anastomosis between profunda brachii artery and posterior humeral circumflex artery
- 19 Humerus
- 20 Profunda brachii artery
- 21 Radial nerve
- 22 Radial collateral artery
- 23 Middle collateral artery
- 24 Lower lateral cutaneous nerve of arm
- 25 Posterior cutaneous nerve of forearm
- 26 Tendon of triceps brachii muscle



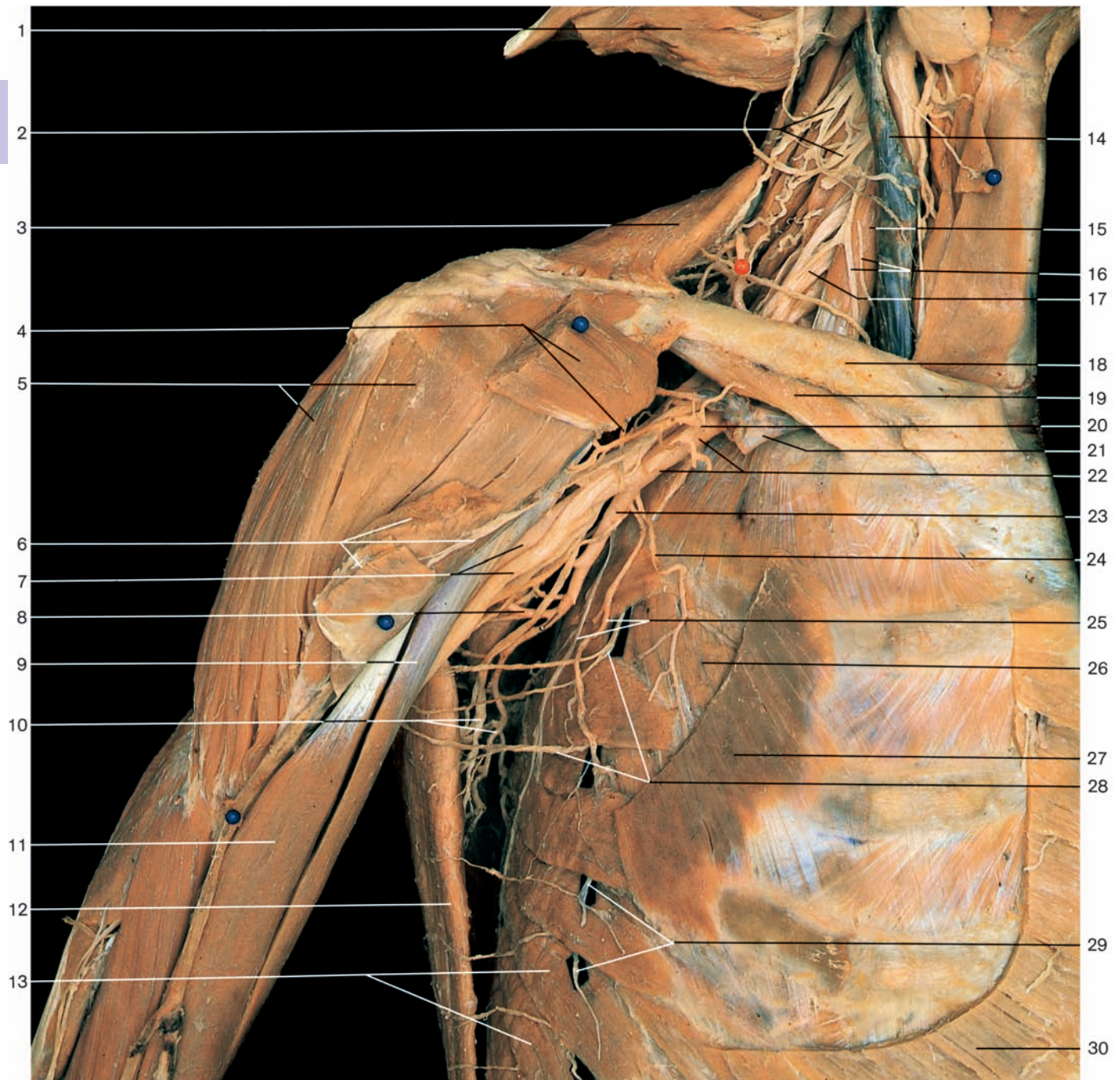
Axillary region (right side, inferior aspect). Dissection of superficial axillary lymph nodes and lymphatic vessels. The pectoralis major muscle has been slightly elevated.

- | | |
|--|--|
| 1 Deltoid muscle | 11 Lateral thoracic artery |
| 2 Cephalic vein | 12 Thoracodorsal artery |
| 3 Median nerve | 13 Lateral cutaneous branch of intercostal nerve |
| 4 Brachial artery | 14 Latissimus dorsi muscle |
| 5 Medial cutaneous nerves of arm and forearm | 15 Thoraco-epigastric vein |
| 6 Ulnar nerve | 16 Serratus anterior muscle |
| 7 Basilic vein | 17 Musculocutaneous nerve |
| 8 Intercostobrachial nerves | 18 Radial nerve |
| 9 Circumflex scapular artery | 19 Pectoralis major muscle |
| 10 Superficial axillary lymph nodes | 20 Nipple |



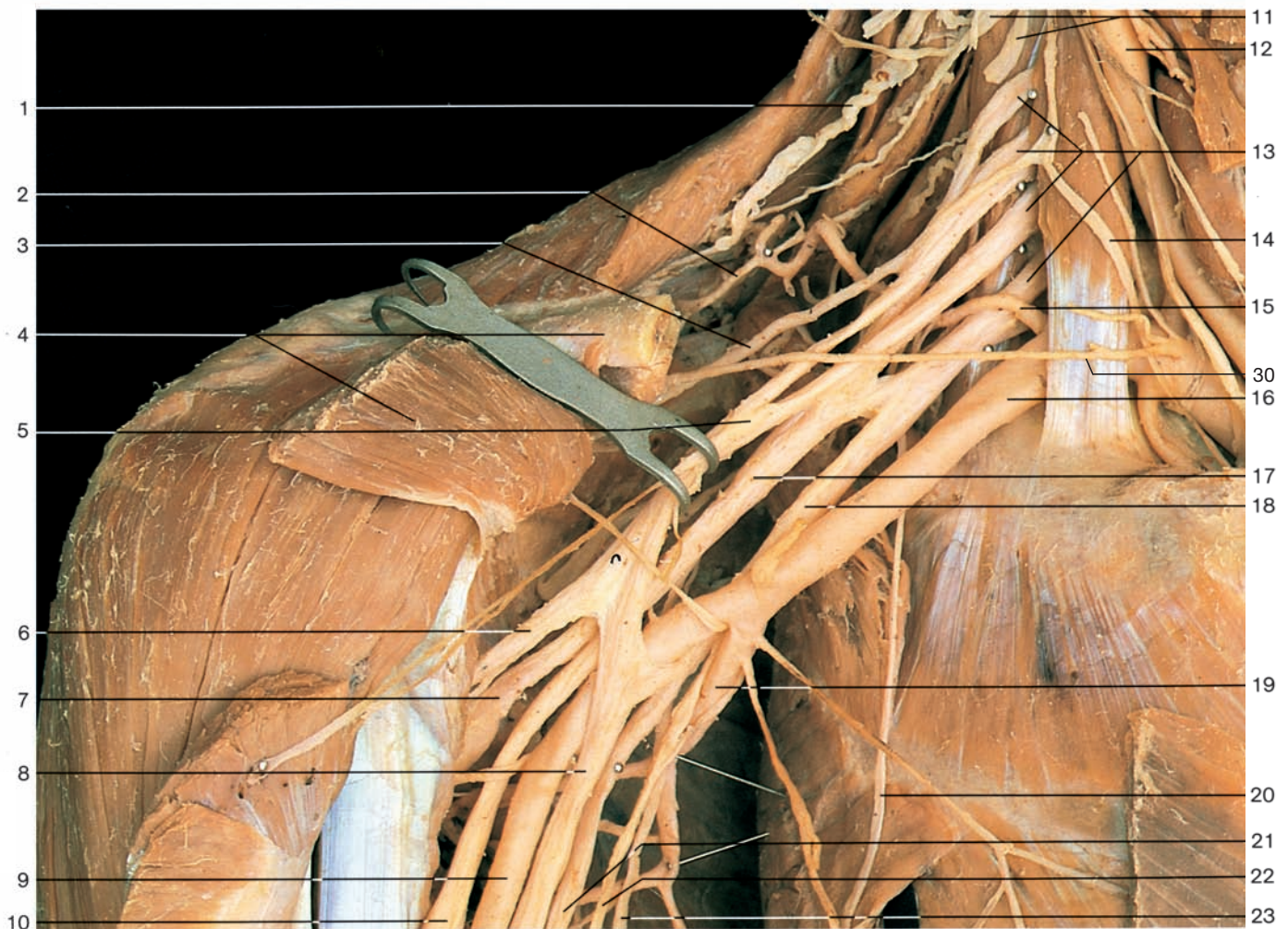
Axillary region (right side, anterior aspect). Dissection of deep axillary lymph nodes. Pectoralis major and minor muscles have been divided and reflected. Shoulder girdle and arm have been elevated and reflected.

- | | |
|---|--|
| 1 Deltoid muscle | 11 Cephalic vein |
| 2 Insertion of pectoralis major muscle | 12 Insertion of pectoralis minor muscle (coracoid process) |
| 3 Coracobrachialis muscle | 13 Musculocutaneous nerve |
| 4 Roots of median nerve and axillary artery | 14 Subclavius muscle |
| 5 Short head of biceps brachii muscle | 15 Thoraco-acromial artery |
| 6 Ulnar nerve and medial cutaneous nerve of forearm | 16 Axillary vein |
| 7 Thoraco-epigastric vein | 17 Clavicle |
| 8 Deep axillary lymph nodes | 18 Pectoralis major and minor muscles (reflected) |
| 9 Latissimus dorsi muscle | 19 Nipple |
| 10 Serratus anterior muscle | 20 Anterior cutaneous branches of intercostal nerves |
| | 21 Anterior layer of rectus sheath |

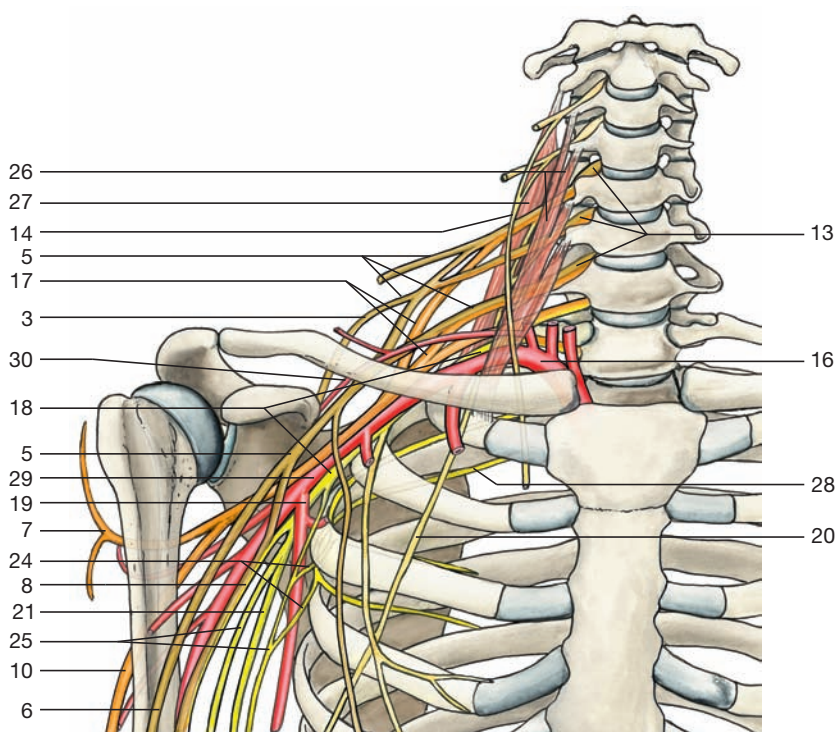


Axillary region (right side, anterior aspect). Pectoralis major and minor muscles have been cut and reflected to display the vessels and nerves of the axilla.

- | | |
|--|---|
| 1 Sternocleidomastoid muscle (cut and reflected) | 16 Phrenic nerve and ascending cervical artery |
| 2 Cervical plexus | 17 Brachial plexus (at the levels of the trunks) |
| 3 Trapezius muscle | 18 Clavicle |
| 4 Pectoralis minor muscle and medial pectoral nerve | 19 Subclavius muscle |
| 5 Deltoid muscle | 20 Thoraco-acromial artery |
| 6 Pectoralis major muscle and lateral pectoral nerve | 21 Subclavian vein (cut) |
| 7 Median nerve and brachial artery | 22 Axillary artery |
| 8 Circumflex scapular artery | 23 Subscapular artery |
| 9 Short head of biceps brachii muscle | 24 Superior thoracic artery |
| 10 Thoracodorsal artery and nerve | 25 Lateral thoracic artery and long thoracic nerve |
| 11 Long head of biceps brachii muscle | 26 External intercostal muscle |
| 12 Latissimus dorsi muscle | 27 Insertion of pectoralis minor muscle |
| 13 Serratus anterior muscle | 28 Intercostobrachial nerves |
| 14 Internal jugular vein | 29 Lateral cutaneous branches of intercostal nerves |
| 15 Anterior scalene muscle | 30 Insertion of pectoralis major muscle |

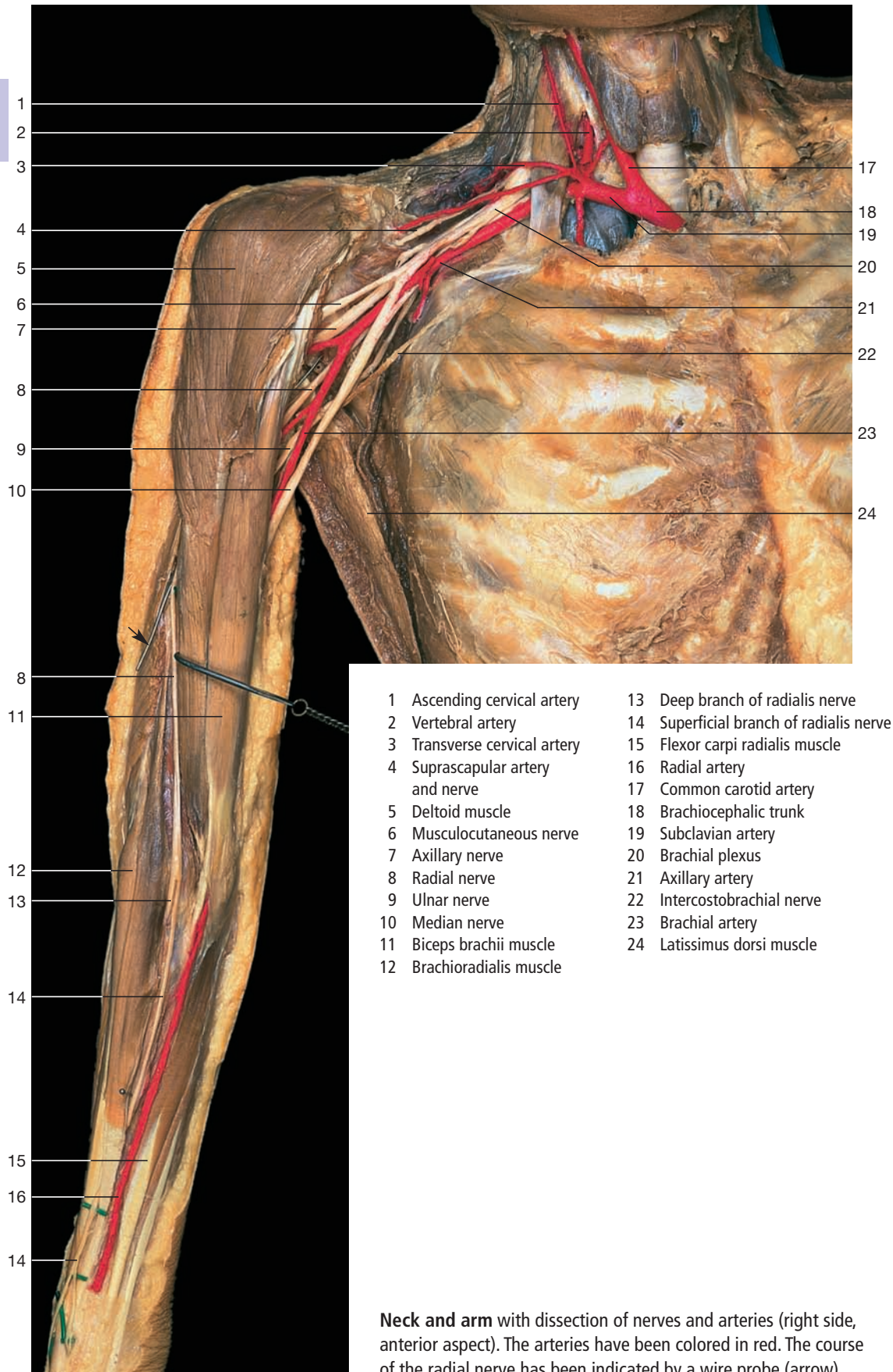


Brachial plexus (anterior aspect). The clavicle and the two pectoralis muscles have been partly removed.

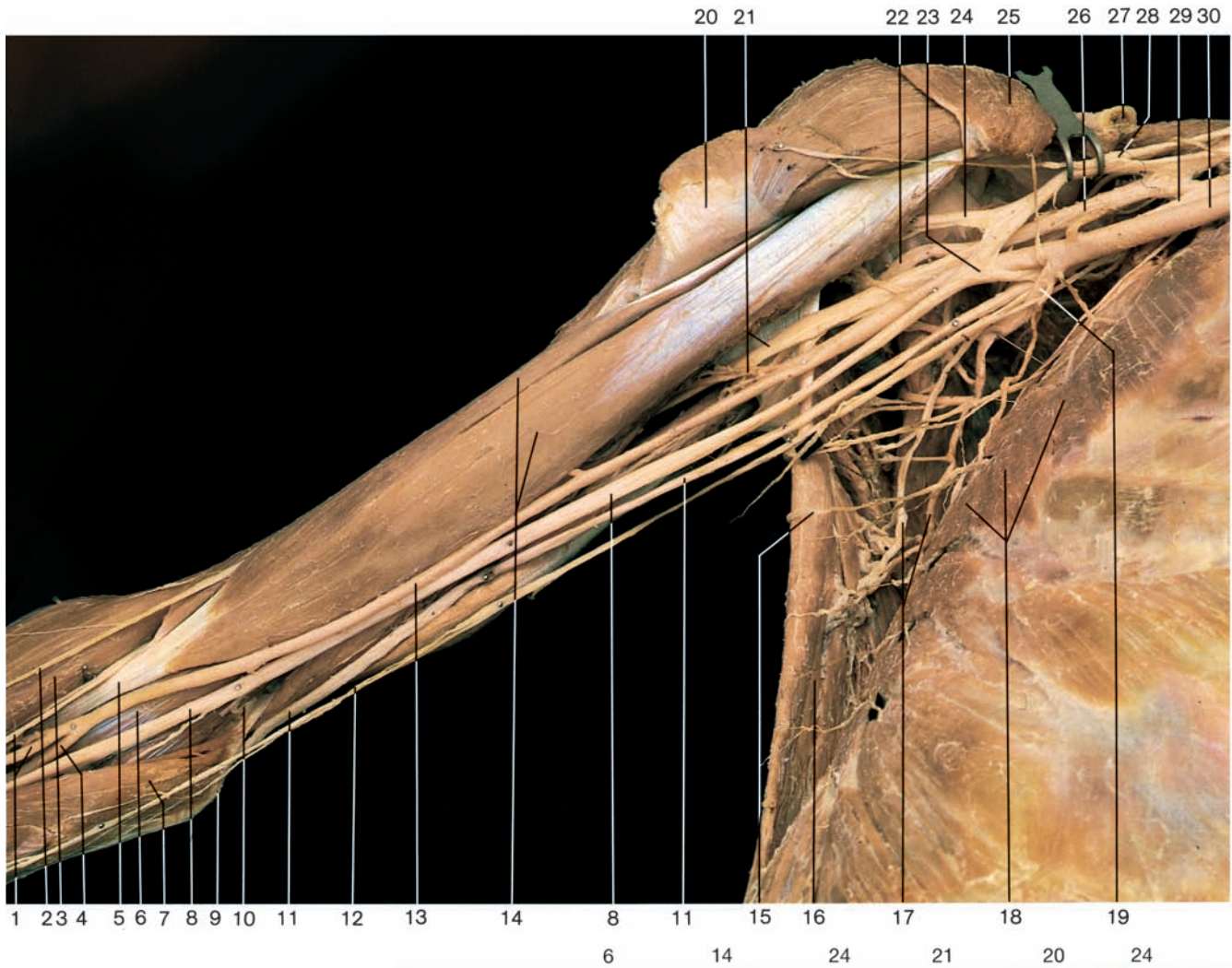


Main branches of brachial plexus. Posterior cord in orange, lateral cord in ochre, and medial cord in light yellow.

- 1 Accessory nerve
- 2 Dorsal scapular artery
- 3 Suprascapular nerve
- 4 Clavicle and pectoralis minor muscle
- 5 Lateral cord of brachial plexus
- 6 Musculocutaneous nerve
- 7 Axillary nerve
- 8 Median nerve
- 9 Brachial artery
- 10 Radial nerve
- 11 Cervical plexus
- 12 Common carotid artery
- 13 Roots of brachial plexus (C_5 – Th_1)
- 14 Phrenic nerve
- 15 Transverse cervical artery
- 16 Subclavian artery
- 17 Posterior cord of brachial plexus
- 18 Medial cord of brachial plexus
- 19 Subscapular artery
- 20 Long thoracic nerve
- 21 Ulnar nerve
- 22 Medial cutaneous nerve of forearm
- 23 Thoracodorsal nerve
- 24 Intercostobrachial nerves
- 25 Medial cutaneous nerves of arm and forearm
- 26 Anterior scalene muscle
- 27 Middle scalene muscle
- 28 Intercostal nerve (Th_3)
- 29 Axillary artery
- 30 Suprascapular artery



Neck and arm with dissection of nerves and arteries (right side, anterior aspect). The arteries have been colored in red. The course of the radial nerve has been indicated by a wire probe (arrow).

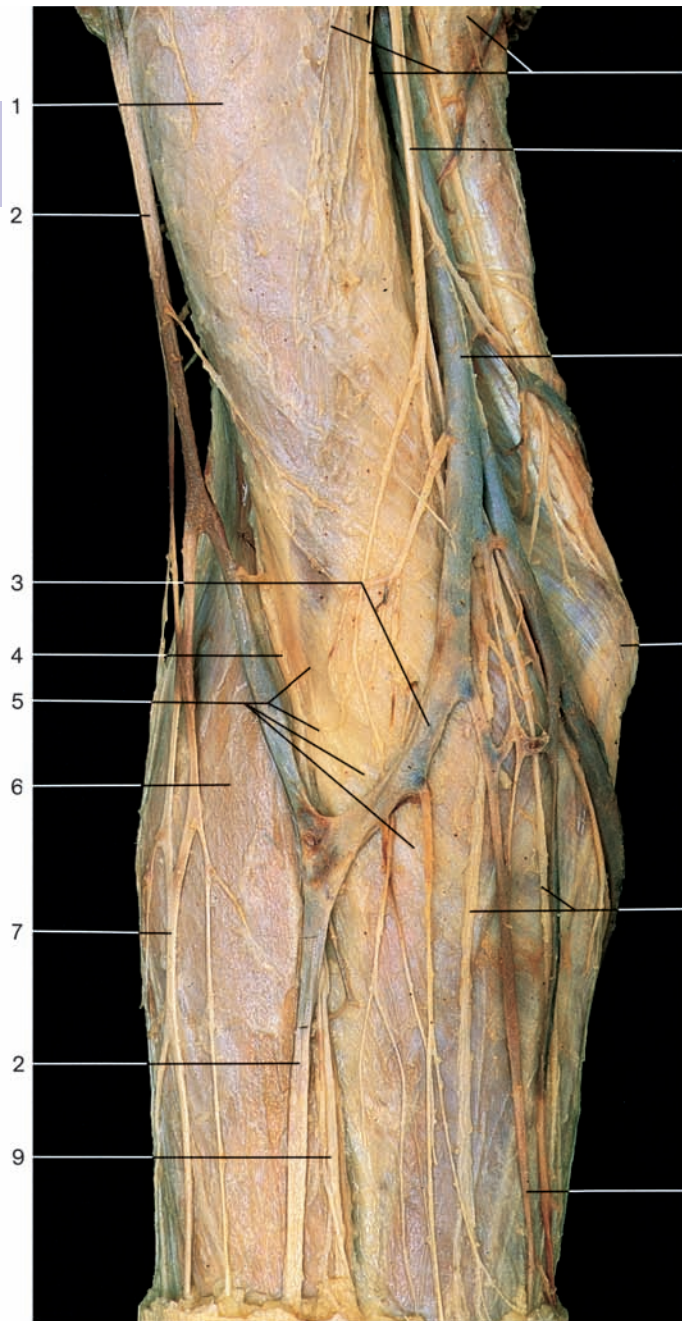


Arm with dissection of nerves and vessels (right side, anterior aspect). The shoulder girdle has been reflected slightly.



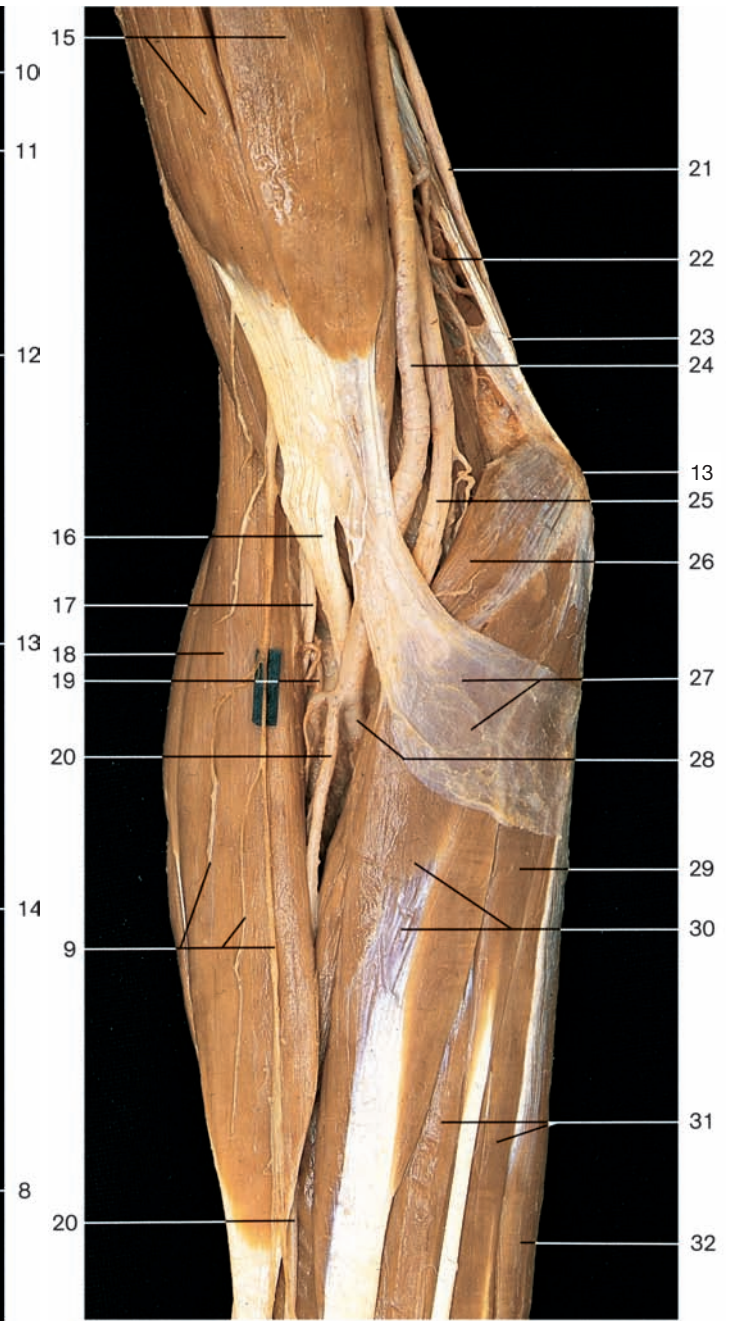
Arm with dissection of nerves and vessels, deeper layer (right side, antero-inferior aspect). The biceps brachii muscle has been reflected.

- | | | | |
|--|--|---|--|
| 1 Radial artery and superficial branch of radial nerve | 8 Median nerve | 17 Thoracodorsal nerve and artery | 24 Musculocutaneous nerve |
| 2 Lateral cutaneous nerve of forearm | 9 Medial epicondyle of humerus | 18 Serratus anterior muscle | 25 Pectoralis minor muscle (reflected) and medial pectoral nerve |
| 3 Brachioradialis muscle | 10 Inferior ulnar collateral artery | 19 Subscapular artery | 26 Posterior cord of brachial plexus |
| 4 Ulnar artery | 11 Ulnar nerve | 20 Pectoralis major muscle (reflected) and lateral pectoral nerve | 27 Clavicle (cut) |
| 5 Tendon of biceps brachii muscle | 12 Medial cutaneous nerve of forearm | 21 Radial nerve and profunda brachii artery | 28 Lateral cord of brachial plexus |
| 6 Brachialis muscle | 13 Brachial artery | 22 Axillary nerve | 29 Medial cord of brachial plexus |
| 7 Pronator teres muscle | 14 Biceps brachii muscle | 23 Roots of the median nerve with axillary artery | 30 Subclavian artery |
| | 15 Intercostobrachial nerve (Th ₃) | | 31 Brachial vein |
| | 16 Latissimus dorsi muscle | | |



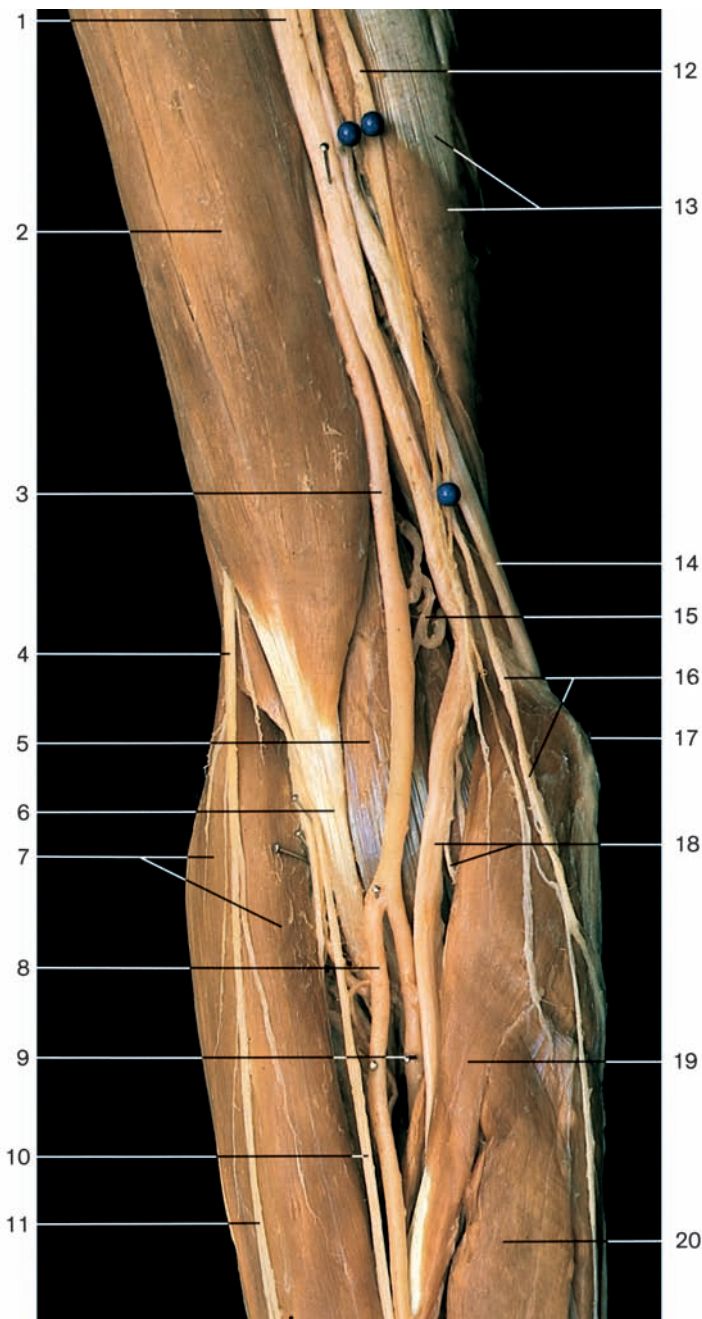
Cubital region (anterior aspect). Dissection of cutaneous nerves and veins.

- 1 Biceps brachii muscle with fascia
- 2 Cephalic vein
- 3 Median cubital vein
- 4 Lateral cutaneous nerve of forearm
- 5 Tendon and aponeurosis of biceps brachii muscle (covered by the antebrachial fascia)
- 6 Brachioradialis muscle with fascia
- 7 Accessory cephalic vein
- 8 Median vein of forearm
- 9 Branches of lateral cutaneous nerve of forearm
- 10 Terminal branches of medial cutaneous nerve of arm
- 11 Medial cutaneous nerve of forearm
- 12 Basilic vein
- 13 Medial epicondyle of humerus
- 14 Terminal branches of medial cutaneous nerve of forearm
- 15 Biceps brachii muscle

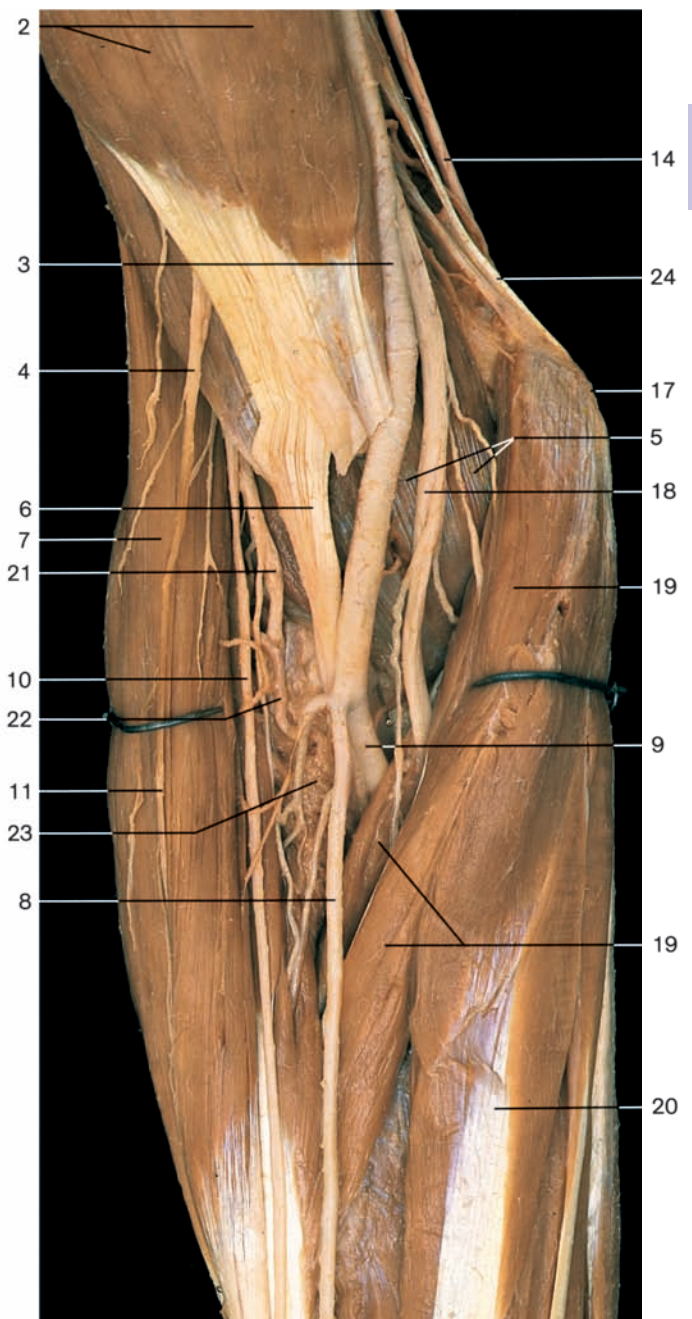


Cubital region, superficial layer (anterior aspect). The fasciae of the muscles have been removed.

- 15 Tendon of biceps brachii muscle
- 16 Radial nerve
- 17 Brachioradialis muscle
- 18 Radial recurrent artery
- 19 Radial artery
- 20 Ulnar nerve
- 21 Superior ulnar collateral artery
- 22 Medial intermuscular septum
- 23 Brachial artery
- 24 Median nerve
- 25 Pronator teres muscle
- 26 Bicipital aponeurosis
- 27 Ulnar artery
- 28 Palmaris longus muscle
- 29 Flexor carpi radialis muscle
- 30 Flexor digitorum superficialis muscle
- 31 Flexor carpi ulnaris muscle
- 32



Cubital region, middle layer (anterior aspect). The bicipital aponeurosis has been removed.



Cubital region, middle layer (anterior aspect). Pronator teres and brachioradialis muscles have been slightly reflected.

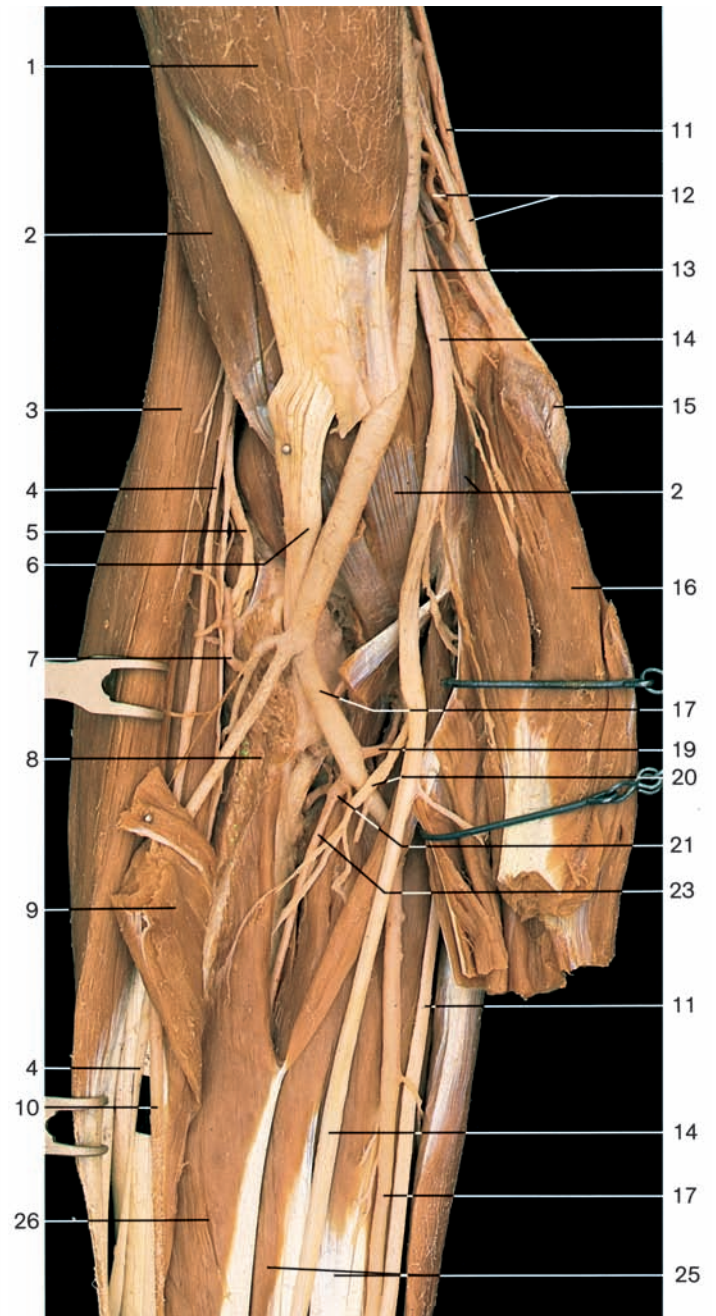
- 1 Median nerve
- 2 Biceps brachii muscle
- 3 Brachial artery
- 4 Lateral cutaneous nerve of forearm (terminal branch of musculocutaneous nerve)
- 5 Brachialis muscle
- 6 Tendon of biceps brachii muscle
- 7 Brachioradialis muscle
- 8 Radial artery
- 9 Ulnar artery
- 10 Superficial branch of radial nerve
- 11 Lateral cutaneous nerve of forearm
- 12 Medial cutaneous nerve of forearm

- 13 Triceps brachii muscle
- 14 Ulnar nerve
- 15 Inferior ulnar collateral artery
- 16 Anterior branch of medial cutaneous nerve of forearm
- 17 Medial epicondyle of humerus
- 18 Median nerve with branches to pronator teres muscle
- 19 Pronator teres muscle
- 20 Flexor carpi radialis muscle
- 21 Deep branch of radial nerve
- 22 Radial recurrent artery
- 23 Supinator muscle
- 24 Medial intermuscular septum of arm



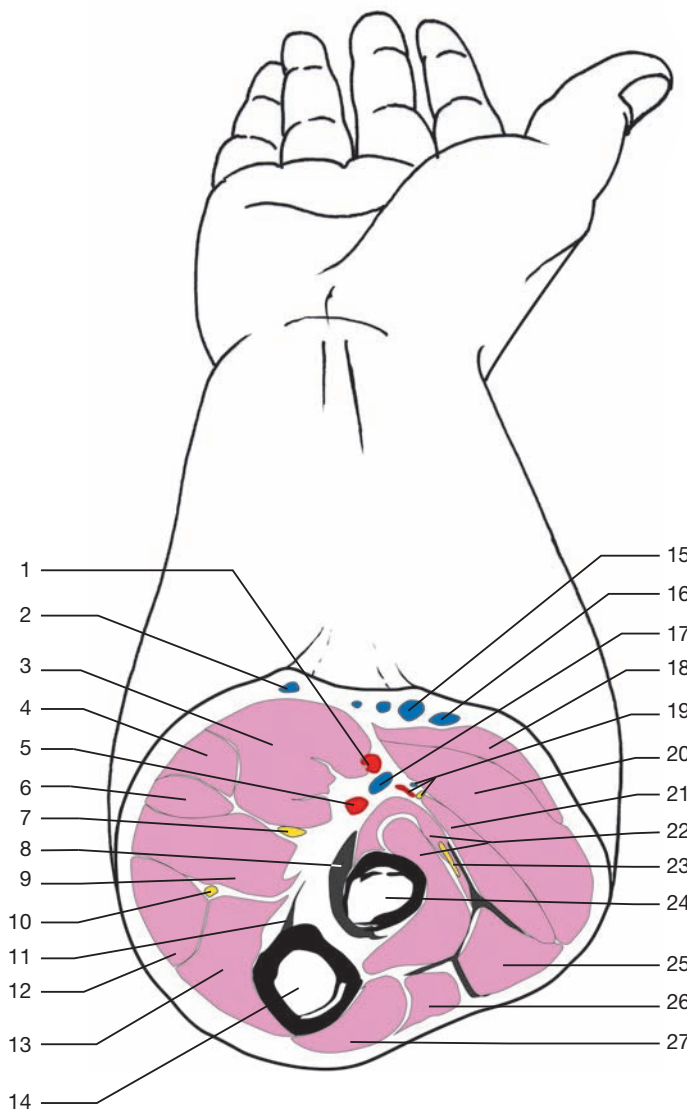
Cubital region, deep layer (anterior aspect). Pronator teres and flexor carpi ulnaris muscles have been cut and reflected.

- 1 Biceps brachii muscle
- 2 Brachialis muscle
- 3 Brachioradialis muscle
- 4 Superficial branch of radial nerve
- 5 Deep branch of radial nerve
- 6 Tendon of biceps brachii muscle
- 7 Radial recurrent artery
- 8 Supinator muscle
- 9 Insertion of pronator teres muscle
- 10 Radial artery
- 11 Ulnar nerve
- 12 Medial intermuscular septum of arm and superior ulnar collateral artery
- 13 Brachial artery



Cubital region, deepest layer (anterior aspect). Flexor digitorum superficialis muscle and the ulnar head of the pronator teres muscle have been cut and reflected.

- 14 Median nerve
- 15 Medial epicondyle of humerus
- 16 Humeral head of pronator teres muscle
- 17 Ulnar artery
- 18 Ulnar head of pronator teres muscle
- 19 Ulnar recurrent artery
- 20 Anterior interosseous nerve
- 21 Common interosseous artery
- 22 Tendinous arch of flexor digitorum superficialis muscle
- 23 Anterior interosseous artery
- 24 Flexor digitorum superficialis muscle
- 25 Flexor digitorum profundus muscle
- 26 Flexor pollicis longus muscle

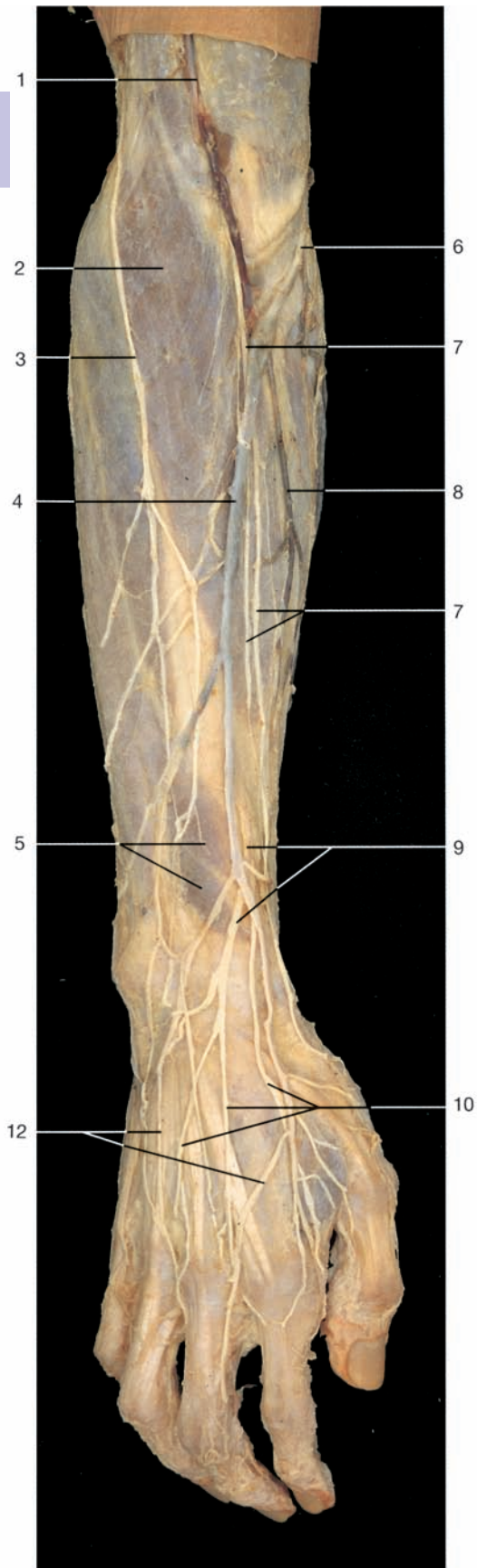


- 1 Radial artery
- 2 Basilic vein
- 3 Pronator teres muscle
- 4 Flexor carpi radialis muscle
- 5 Ulnar artery
- 6 Palmaris longus muscle
- 7 Median nerve
- 8 Tendon of biceps brachii muscle
- 9 Flexor digitorum superficialis muscle
- 10 Ulnar nerve
- 11 Tendon of brachialis muscle
- 12 Flexor carpi ulnaris muscle
- 13 Flexor digitorum profundus muscle
- 14 Ulna
- 15 Median cubital vein
- 16 Cephalic antebrachii vein
- 17 Radial vein
- 18 Brachioradialis muscle
- 19 Superficial branch of radial nerve, radial artery and vein
- 20 Extensor carpi radialis longus muscle
- 21 Extensor carpi radialis brevis muscle
- 22 Supinator muscle
- 23 Deep branch of radial nerve
- 24 Radius
- 25 Extensor digitorum muscle
- 26 Extensor carpi ulnaris muscle
- 27 Anconeus muscle

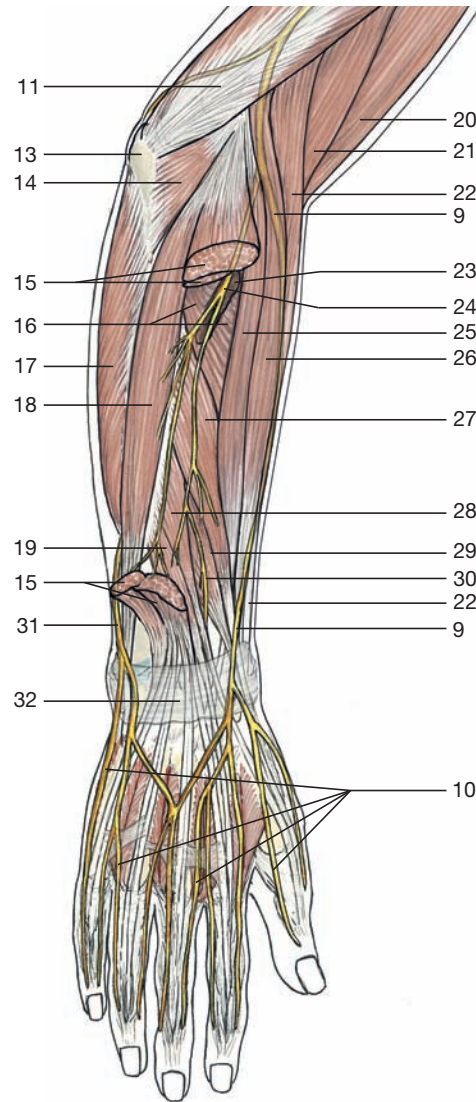
Axial section through the forearm distally of the elbow joint revealing the arrangement of muscles, nerves, and vessels (compare with the MRI scan below).



Axial section through the forearm distally of the elbow joint (MRI scan). (From Heuck et al., MRT-Atlas, 2009.) For details see schematic drawing above.

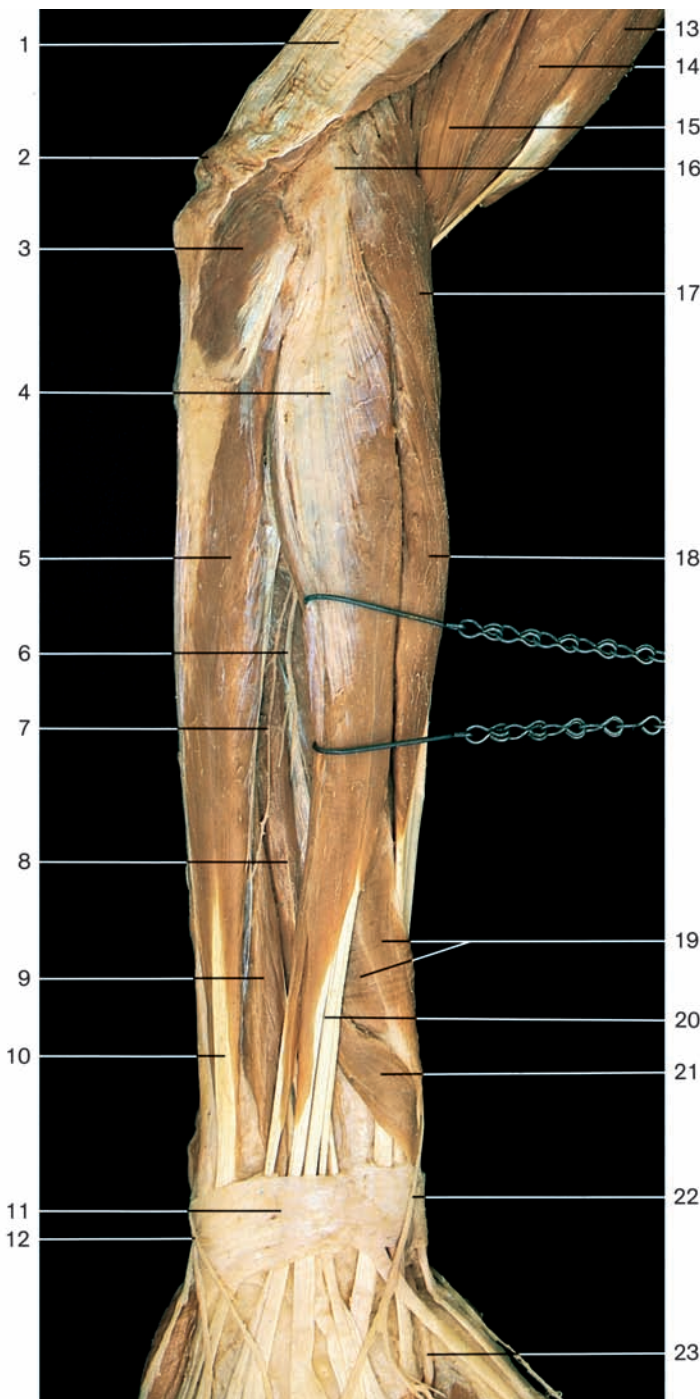


Posterior regions of forearm and hand with superficial veins and cutaneous nerves (right side).

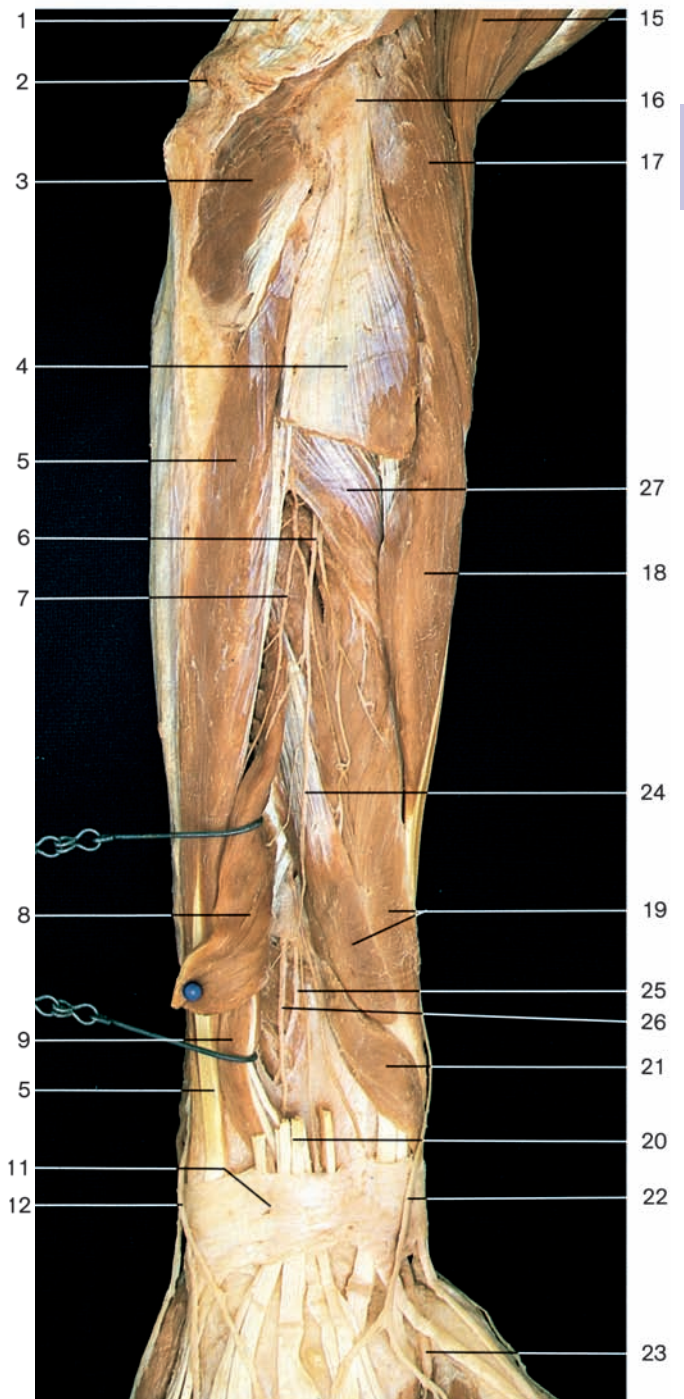


Course of the nerves to forearm and hand (posterior aspect). Yellow = radial and ulnar nerves.

- | | |
|--|--|
| 1 Cephalic vein | 15 Extensor digitorum and extensor digiti minimi muscles |
| 2 Brachioradialis muscle covered by its fascia | 16 Supinator muscle |
| 3 Posterior cutaneous nerve of forearm (branch of radial nerve) | 17 Flexor carpi ulnaris muscle |
| 4 Cephalic vein of forearm | 18 Extensor carpi ulnaris muscle |
| 5 Extensor pollicis longus and brevis muscles covered by their fascia | 19 Extensor indicis muscle |
| 6 Median cubital vein | 20 Biceps brachii muscle |
| 7 Lateral cutaneous nerves of forearm (branch of musculocutaneous nerve) | 21 Brachialis muscle |
| 8 Intermedian vein of forearm | 22 Brachioradialis muscle |
| 9 Superficial branch of radial nerve | 23 Supinator channel |
| 10 Dorsal digital branches of radial nerve | 24 Deep branch of radial nerve |
| 11 Triceps brachii muscle | 25 Extensor carpi radialis brevis muscle |
| 12 Dorsal venous network of hand | 26 Extensor carpi radialis longus muscle |
| 13 Olecranon | 27 Abductor pollicis longus muscle |
| 14 Anconeus muscle | 28 Extensor pollicis longus muscle |
| | 29 Extensor pollicis brevis muscle |
| | 30 Posterior interosseus nerve |
| | 31 Ulnar nerve |
| | 32 Extensor retinaculum |



Posterior region of the forearm with vessels and nerves, superficial layer (right side).

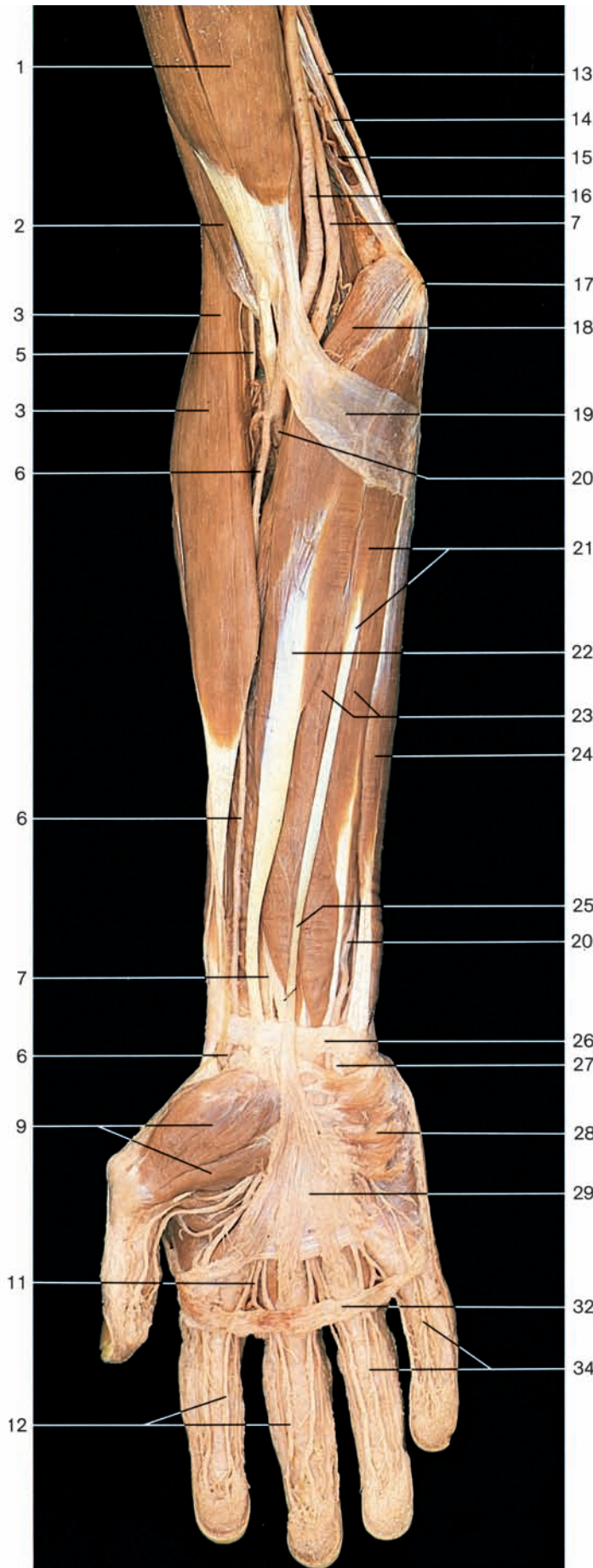


Posterior region of the forearm with vessels and nerves, deep layer (right side).

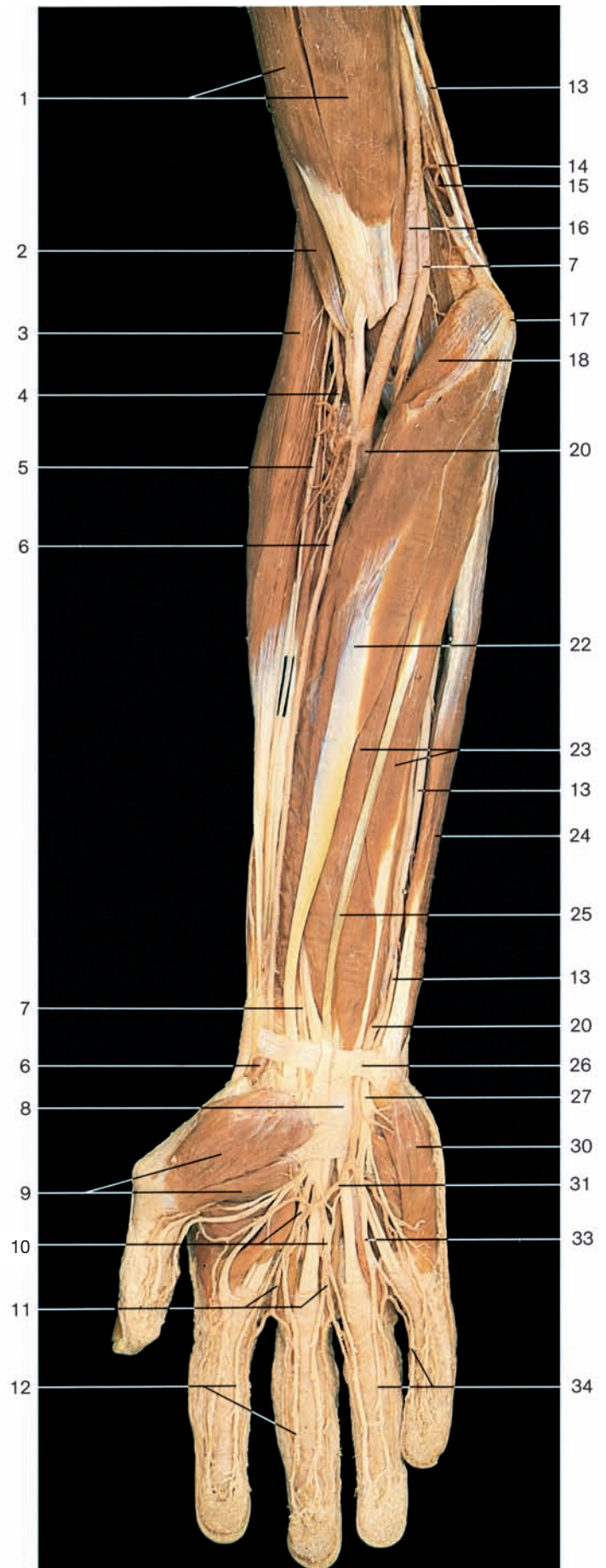
- 1 Tendon of triceps brachii muscle
- 2 Olecranon
- 3 Anconeus muscle
- 4 Extensor digitorum muscle
- 5 Extensor carpi ulnaris muscle
- 6 Deep branch of radial nerve
- 7 Posterior interosseous artery
- 8 Extensor pollicis longus muscle
- 9 Extensor indicis muscle
- 10 Tendon of extensor carpi ulnaris muscle

- 11 Extensor retinaculum
- 12 Dorsal branch of ulnar nerve
- 13 Biceps brachii muscle
- 14 Brachialis muscle
- 15 Brachioradialis muscle
- 16 Lateral epicondyle of humerus
- 17 Extensor carpi radialis longus muscle
- 18 Extensor carpi radialis brevis muscle
- 19 Abductor pollicis longus muscle
- 20 Tendons of extensor digitorum muscle

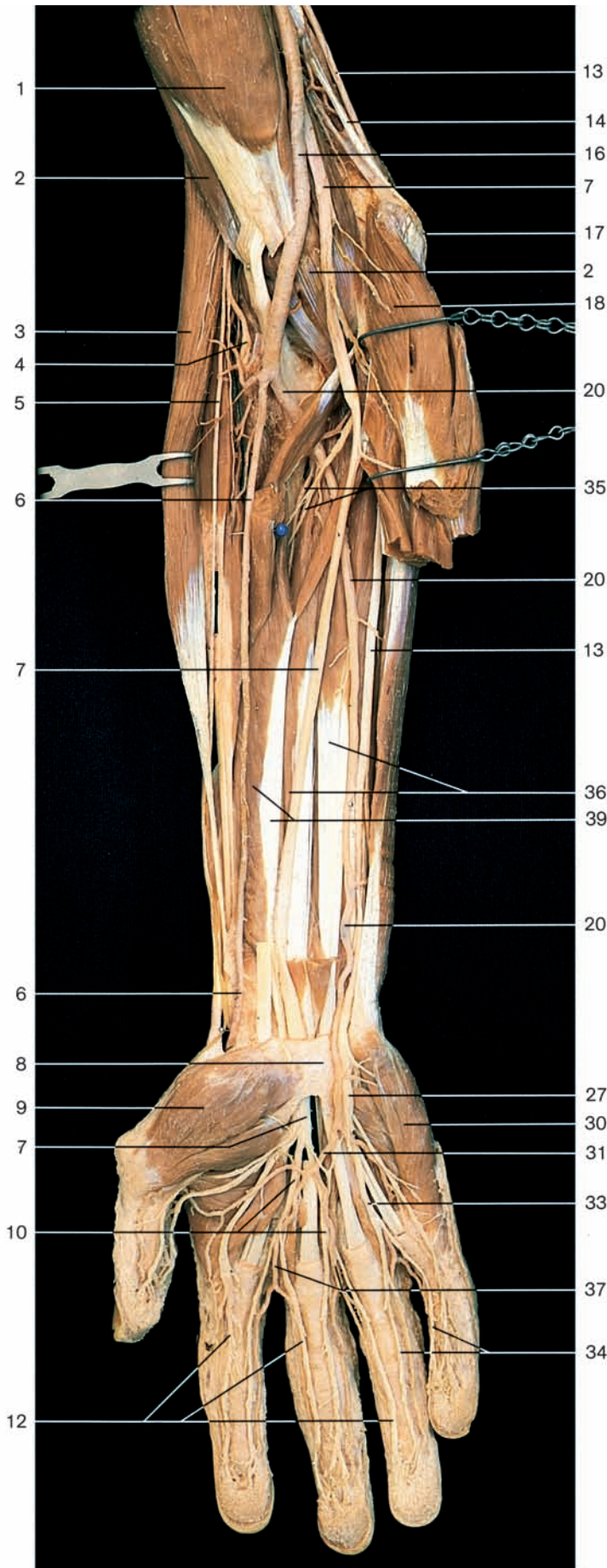
- 21 Extensor pollicis brevis muscle
- 22 Superficial branch of radial nerve
- 23 Radial artery
- 24 Posterior interosseous nerve
- 25 Posterior interosseous branch of radial nerve
- 26 Posterior branch of anterior interosseous artery
- 27 Supinator muscle



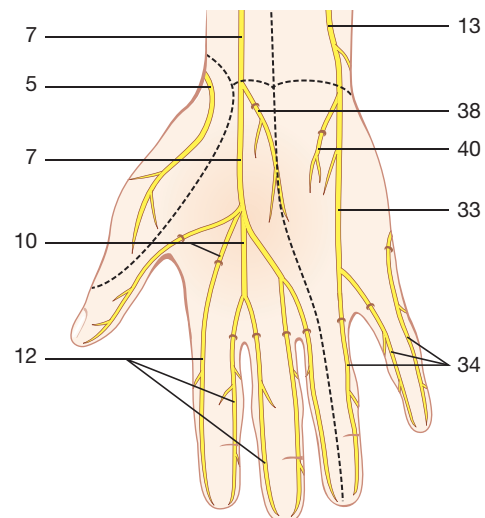
Anterior regions of forearm and hand with vessels and nerves, superficial layer (right side).



Anterior regions of forearm and hand with vessels and nerves, superficial layer (right side). The palmar aponeurosis of the hand and the bicipital aponeurosis have been removed.

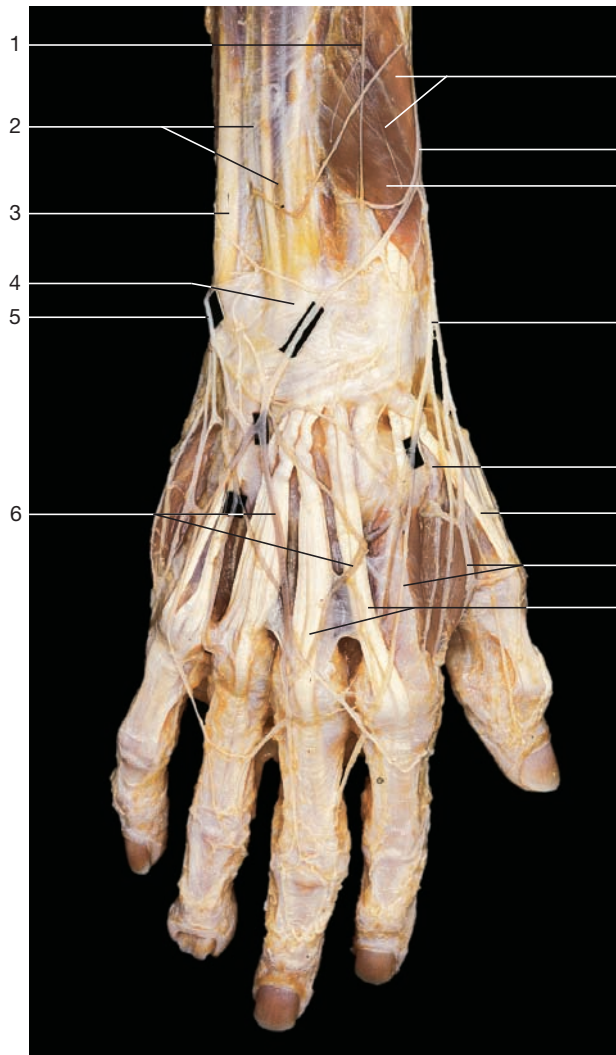


- 1 Biceps brachii muscle
- 2 Brachialis muscle
- 3 Brachioradialis muscle
- 4 Deep branch of radial nerve
- 5 Superficial branch of radial nerve
- 6 Radial artery
- 7 Median nerve
- 8 Flexor retinaculum
- 9 Thenar muscles
- 10 Common palmar digital nerves of median nerve
- 11 Common palmar digital arteries
- 12 Proper palmar digital nerves of median nerve
- 13 Ulnar nerve
- 14 Medial intermuscular septum of arm
- 15 Superior ulnar collateral artery
- 16 Brachial artery
- 17 Medial epicondyle of humerus
- 18 Pronator teres muscle
- 19 Bicipital aponeurosis
- 20 Ulnar artery
- 21 Palmaris longus muscle
- 22 Flexor carpi radialis muscle
- 23 Flexor digitorum superficialis muscle
- 24 Flexor carpi ulnaris muscle
- 25 Tendon of palmaris longus muscle
- 26 Remnant of antebrachial fascia
- 27 Superficial branch of ulnar nerve
- 28 Palmaris brevis muscle
- 29 Palmar aponeurosis
- 30 Hypothenar muscles
- 31 Superficial palmar arch
- 32 Superficial transverse metacarpal ligament
- 33 Common palmar digital branch of ulnar nerve
- 34 Proper palmar digital branches of ulnar nerve
- 35 Anterior interosseous artery and nerve
- 36 Flexor digitorum profundus muscle
- 37 Common palmar digital arteries
- 38 Palmar branch of median nerve
- 39 Flexor pollicis longus muscle
- 40 Palmar cutaneous branch of ulnar nerve

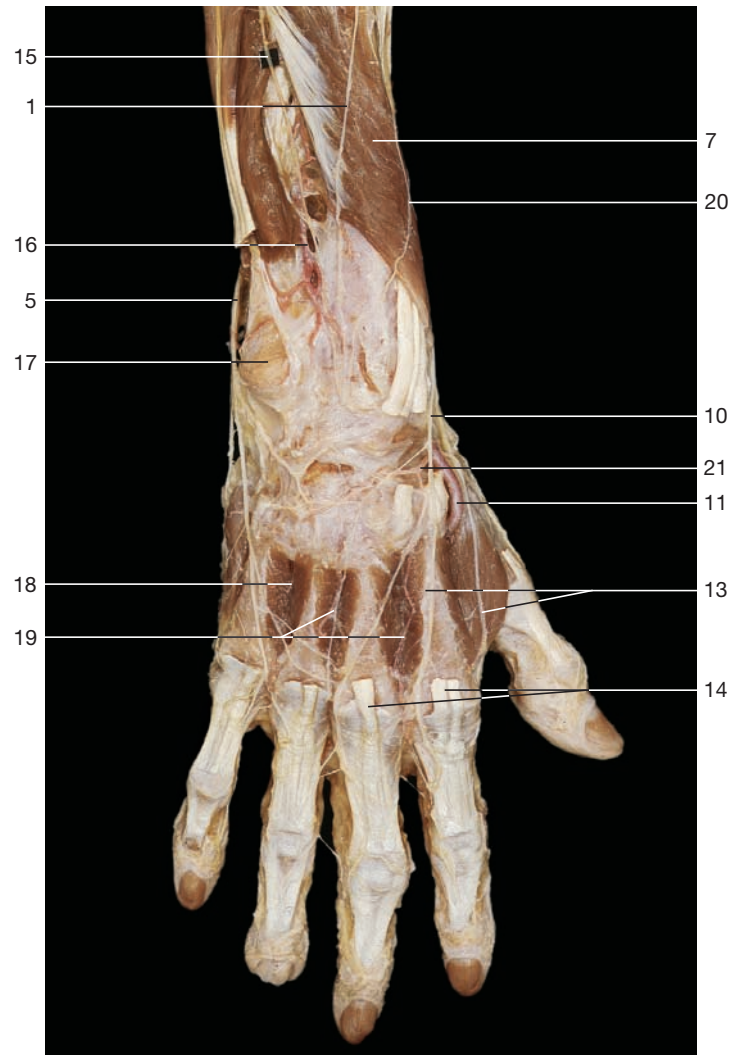


Anterior regions of forearm and hand with vessels and nerves, deep layer (right side). The superficial layer of the flexor muscles has been removed.

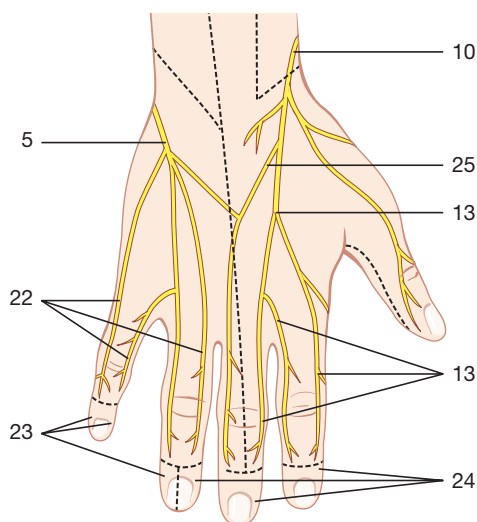
Innervation pattern of the hand (palmar aspect).
3½ digits by median nerve, 1½ digits by ulnar nerve.



Dorsum of the right hand, superficial layer. Cutaneous nerves and veins are depicted.

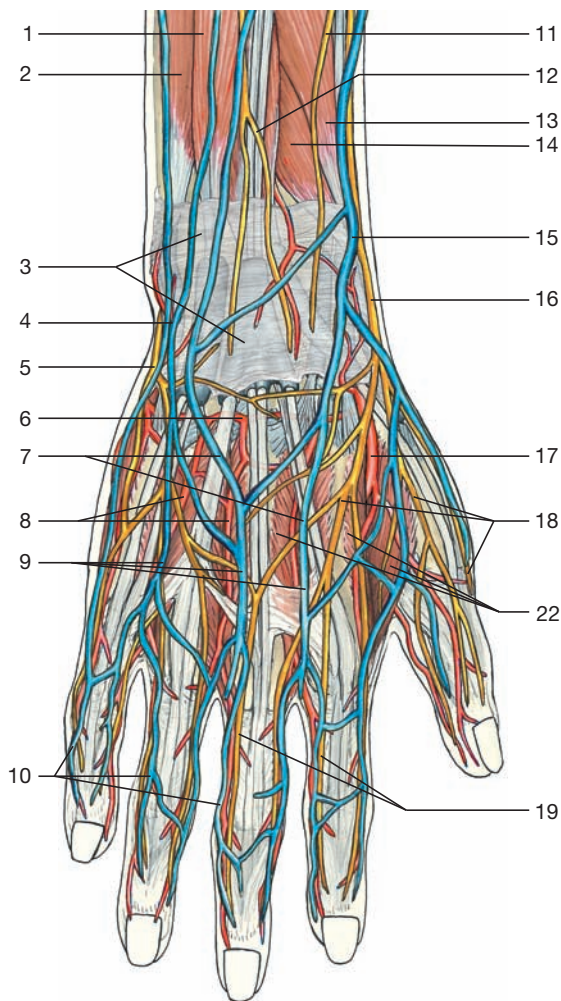


Dorsum of the right hand, deeper layer. Extensor digitorum muscle has been partly removed.



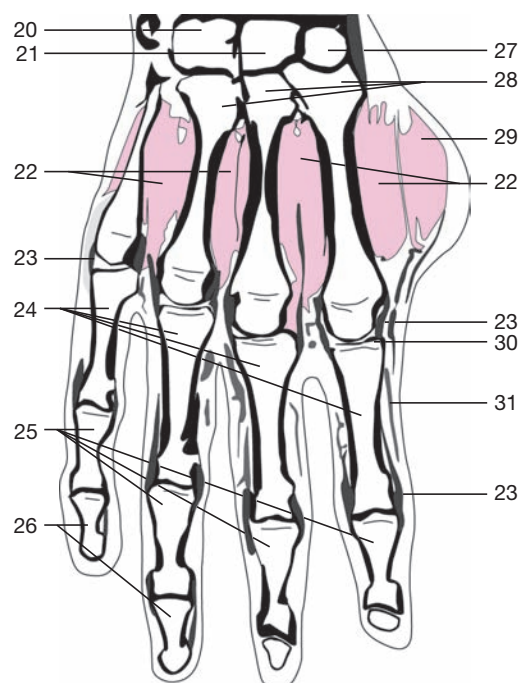
Innervation pattern of the hand (dorsal aspect). 2½ digits by radial nerve, 2½ digits by ulnar nerve. Note that the terminal branches to the dorsal surfaces of the distal phalanges are derived from the palmar digital nerves. The cutaneous distribution varies; often 3½ digits are innervated by the radial and 1½ digits by the ulnar nerve.

- 1 Posterior cutaneous nerve of forearm (branch of radial nerve)
- 2 Extensor digitorum muscle
- 3 Tendon of extensor carpi ulnaris muscle
- 4 Extensor retinaculum
- 5 Ulnar nerve
- 6 Dorsal venous network of hand
- 7 Abductor pollicis brevis muscle
- 8 Cephalic vein
- 9 Extensor pollicis brevis muscle
- 10 Superficial branch of radial nerve
- 11 Radial artery
- 12 Tendon of extensor pollicis longus muscle
- 13 Dorsal digital branches of radial nerve
- 14 Tendons of extensor digitorum muscle with intertendinous connections
- 15 Posterior interosseous nerve (branch of the deep radial nerve)
- 16 Posterior interosseous artery
- 17 Styloid process of ulna
- 18 Dorsal interosseous muscle
- 19 Dorsal carpal branch of radial artery
- 20 Lateral cutaneous nerve of forearm (branch of musculocutaneous nerve)
- 21 Dorsal metacarpal artery
- 22 Dorsal digital branches of ulnar nerve
- 23 Regions supplied by palmar digital nerves (ulnar nerve)
- 24 Regions supplied by palmar digital nerves (median nerve)
- 25 Communicating branch with ulnar nerve

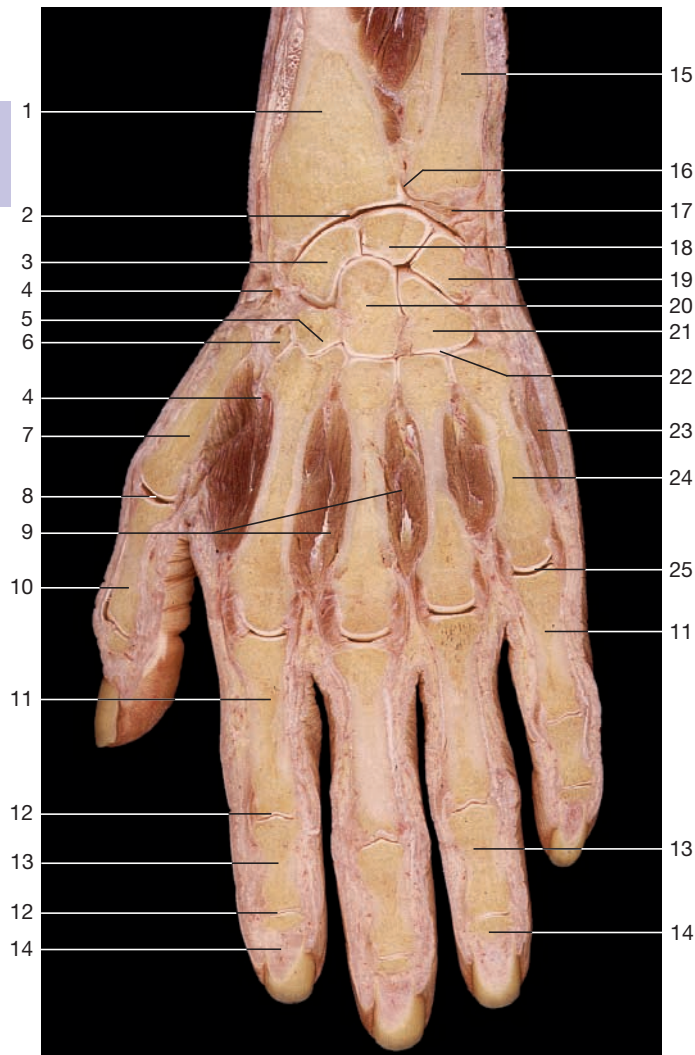


- 1 Extensor digiti minimi muscle
- 2 Extensor carpi ulnaris muscle
- 3 Extensor retinaculum
- 4 Basilic vein
- 5 Dorsal branch of ulnar nerve
- 6 Dorsal carpal branch of ulnar artery
- 7 Dorsal venous network of hand
- 8 Dorsal metacarpal arteries
- 9 Dorsal metacarpal veins
- 10 Dorsal digital veins
- 11 Lateral cutaneous nerve of forearm
- 12 Posterior cutaneous nerve of forearm
- 13 Abductor pollicis longus muscle
- 14 Abductor pollicis brevis muscle
- 15 Cephalic vein
- 16 Superficial branch of radial nerve
- 17 Radial artery
- 18 Dorsal digital branches of radial nerve
- 19 Dorsal digital nerves for the fingers
- 20 Hamate bone
- 21 Capitate bone
- 22 Dorsal interossei muscles
- 23 Collateral ligament
- 24 Proximal phalanges II–V
- 25 Middle phalanges II–V
- 26 Distal phalanges IV and V
- 27 Os trapezoideum
- 28 Metacarpal bones II–IV
- 29 Opponens pollicis muscle
- 30 Second metacarpophalangeal joint
- 31 Proper palmar digital artery

Dorsum of the right hand, superficial layer.
Cutaneous veins, nerves, and arteries are depicted.
The dorsal fascia of the hand has been removed.



Coronal section through the right hand (dorsal aspect). (From Heuck et al., MRT-Atlas, 2009.)
For details see the schematic drawing alongside.



Coronal section through the left hand at the level of the interossei muscles (dorsal aspect).

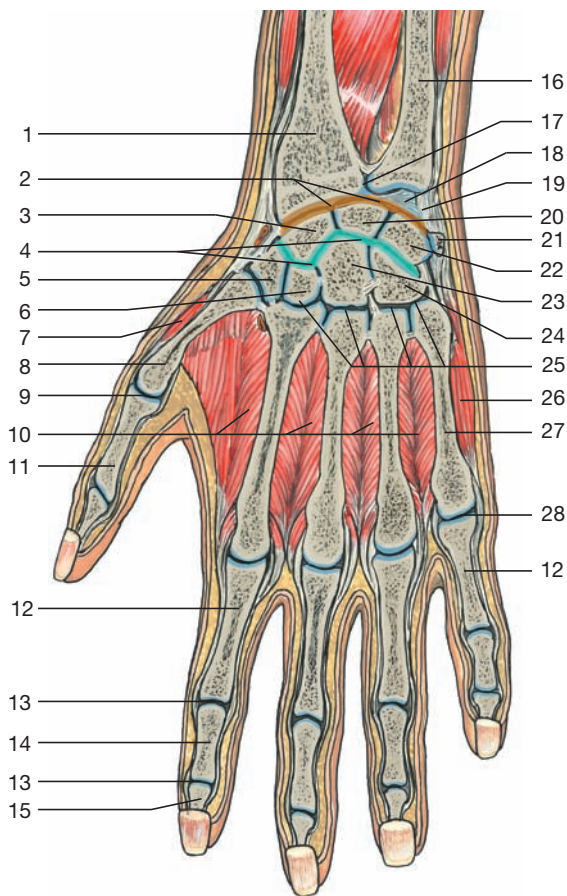


Coronal section through the left hand at the level of the interossei muscles (dorsal aspect; MRI scan).
(Courtesy of Prof. Heuck, Munich, Germany.)

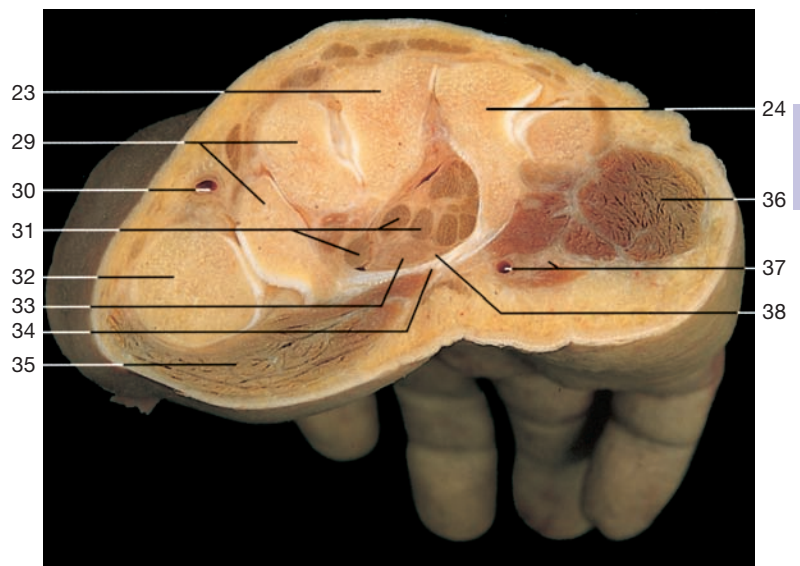
- 1 Radius
- 2 Radiocarpal joint
- 3 Scaphoid (navicular) bone
- 4 Radial artery
- 5 Trapezoid bone
- 6 Trapezium bone
- 7 First metacarpal bone
- 8 Metacarpophalangeal joint of thumb
- 9 Interossei muscles

- 10 Proximal phalanx of thumb
- 11 Proximal phalanx of fingers
- 12 Interphalangeal joints
- 13 Middle phalanx
- 14 Distal phalanx
- 15 Ulna
- 16 Distal radio-ulnar joint
- 17 Articular disc
- 18 Lunate bone

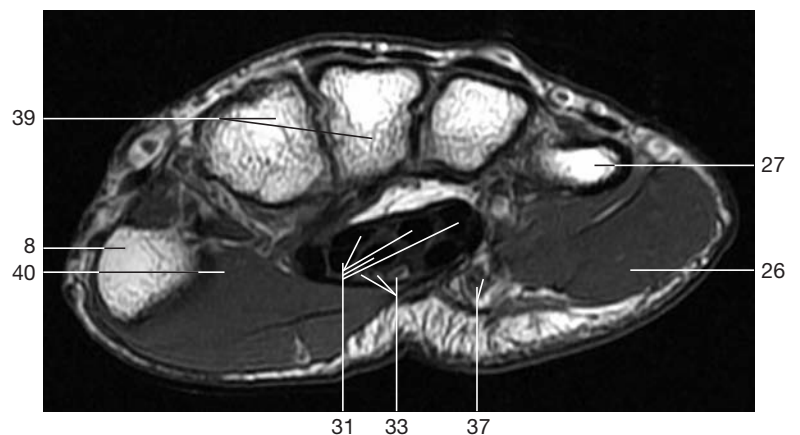
- 19 Triquetral bone
- 20 Capitate bone
- 21 Hamate bone
- 22 Carpometacarpal joints
- 23 Abductor digiti minimi muscle
- 24 Fifth metacarpal bone
- 25 Metacarpophalangeal joint
- 26 Adductor pollicis muscle
- 27 Proper palmar digital arteries



Coronal section through the left hand at the level of the interossei muscles (dorsal aspect).

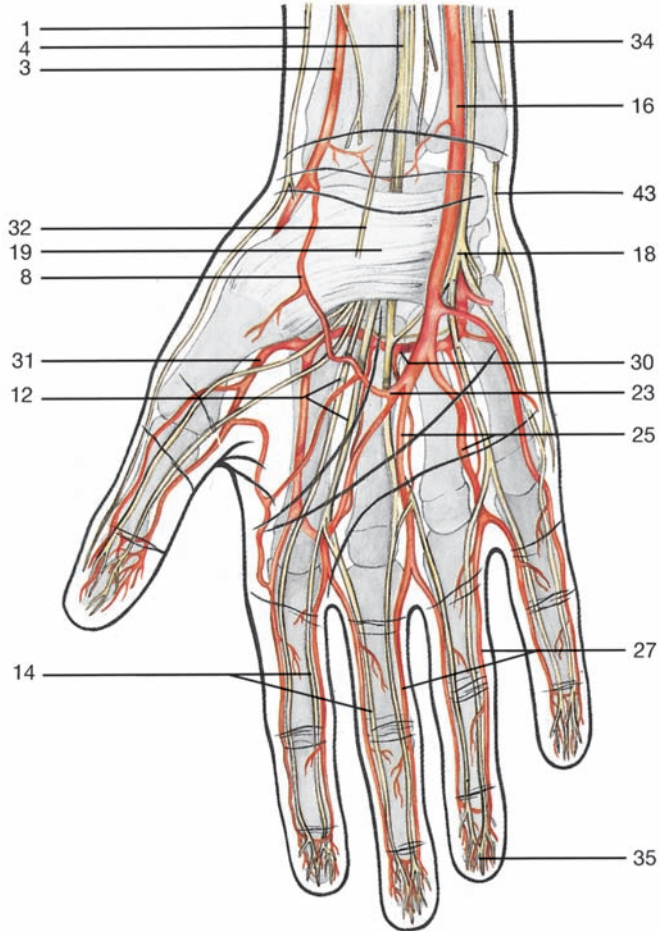
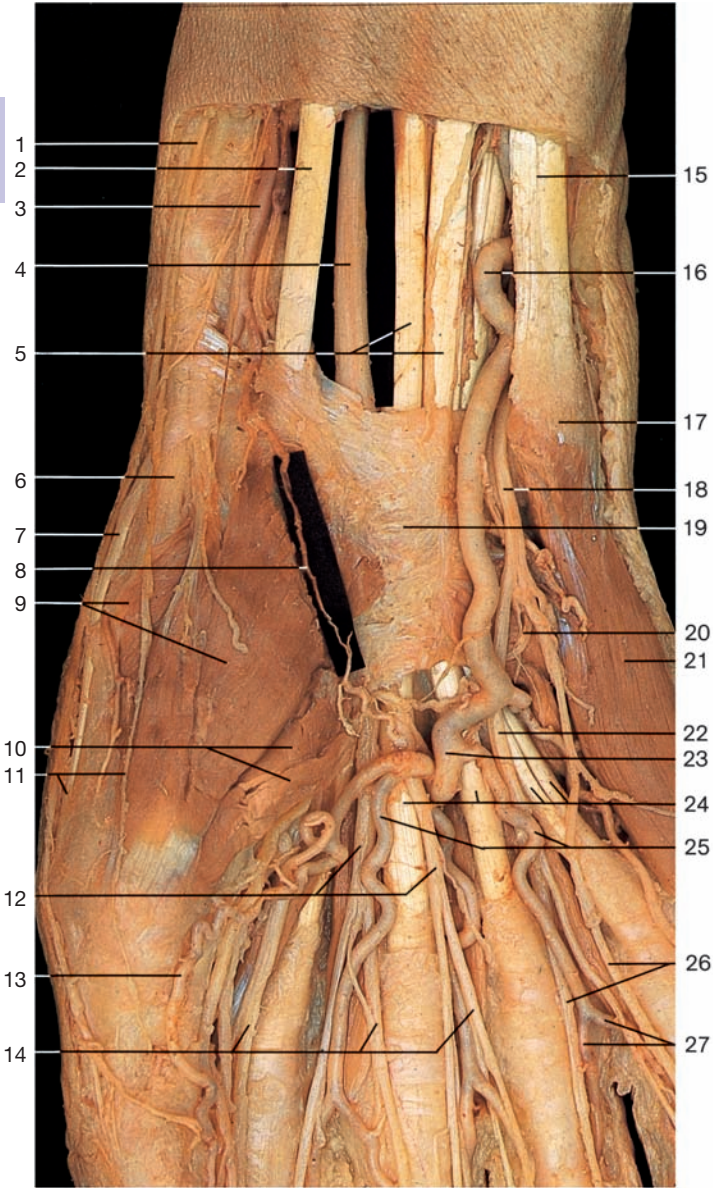


Axial section through the right hand at the level of the carpal tunnel (proximal aspect).



Axial section through the right hand at the level of the carpal tunnel (proximal aspect; MRI scan). (Courtesy of Prof. Heuck, Munich, Germany.)

- | | | |
|-----------------------------------|----------------------------------|--|
| 1 Radius | 15 Distal phalanx | 29 Trapezium and trapezoid bones |
| 2 Radiocarpal joint | 16 Ulna | 30 Radial artery |
| 3 Scaphoid (navicular) bone | 17 Distal radio-ulnar joint | 31 Tendons of flexor digitorum superficialis and profundus muscles |
| 4 Metacarpal joint | 18 Articular disc | 32 First metacarpal bone |
| 5 Trapezium bone | 19 Ulnar collateral ligament | 33 Median nerve |
| 6 Trapezoid bone | 20 Lunate bone | 34 Flexor retinaculum |
| 7 Opponens pollicis muscle | 21 Pisiform bone | 35 Thenar muscles |
| 8 First metacarpal bone | 22 Triquetrum bone | 36 Hypothenar muscles |
| 9 First metacarpophalangeal joint | 23 Capitate bone | 37 Ulnar artery and nerve |
| 10 Interossei muscles | 24 Hamate bone | 38 Carpal tunnel |
| 11 Proximal phalanx of thumb | 25 Carpometacarpal joints | 39 Second and third metacarpal bones |
| 12 Proximal phalanx of fingers | 26 Abductor digiti minimi muscle | 40 Adductor pollicis muscle |
| 13 Interphalangeal joints | 27 Fifth metacarpal bone | |
| 14 Middle phalanx | 28 Metacarpophalangeal joints | |

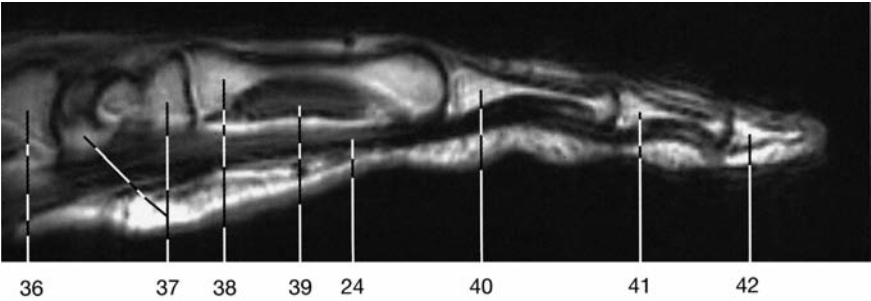


Palm of the right hand with arteries and nerves.

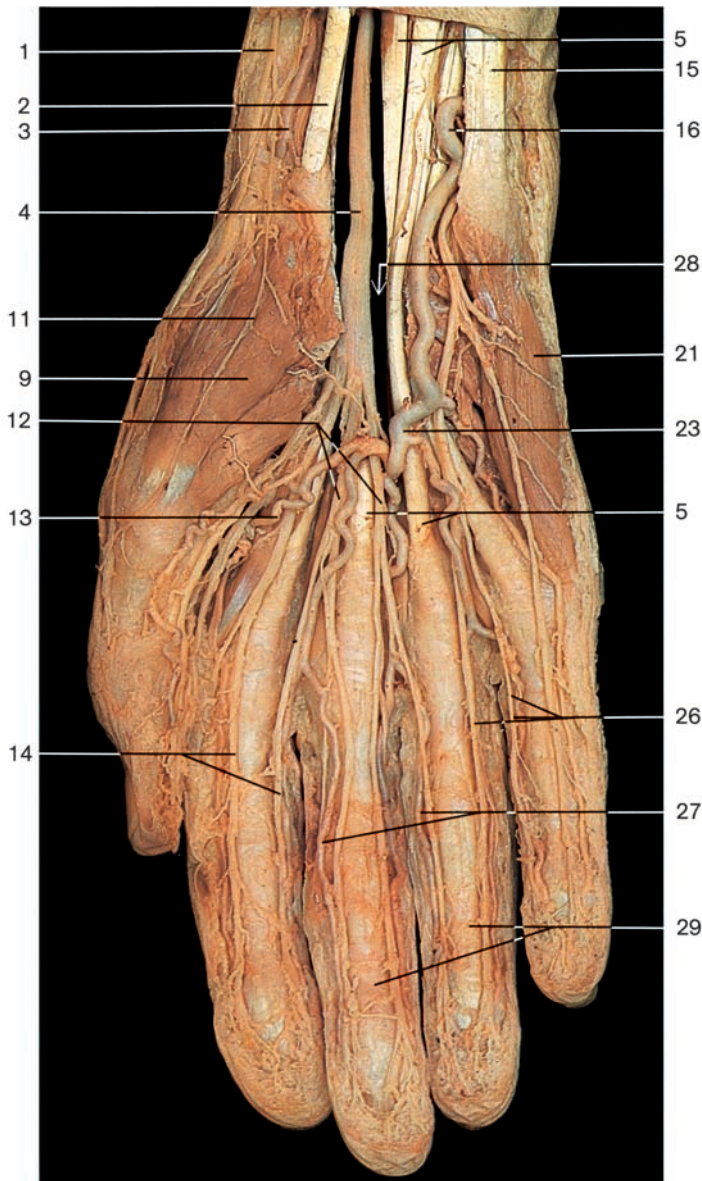
◁ **Anterior region of wrist and palm of the right hand, superficial layer.**



Longitudinal section through the hand at the level of the third finger.

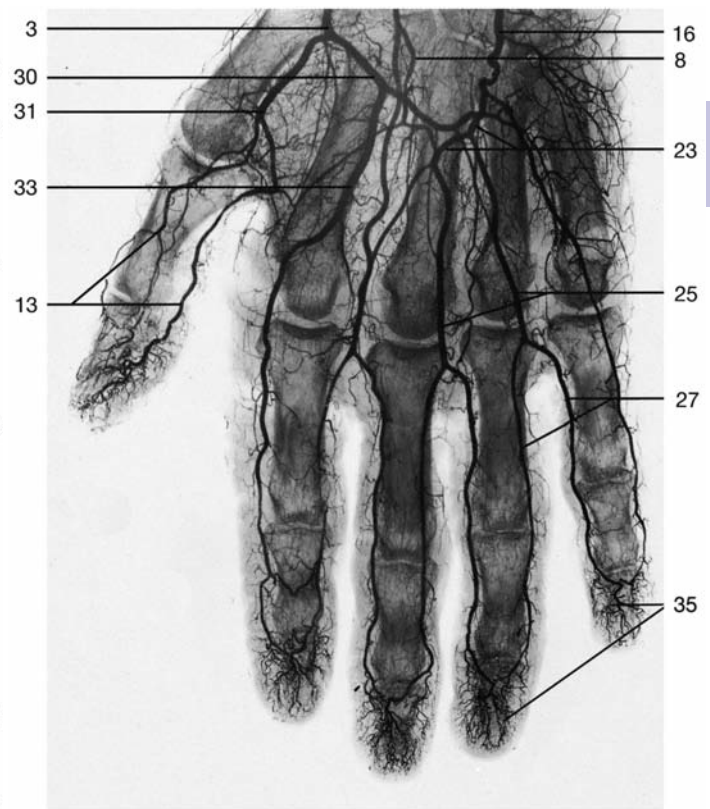


Longitudinal section through the hand at the level of the third finger (MRI scan).
(Courtesy of Prof. Heuck, Munich, Germany.)



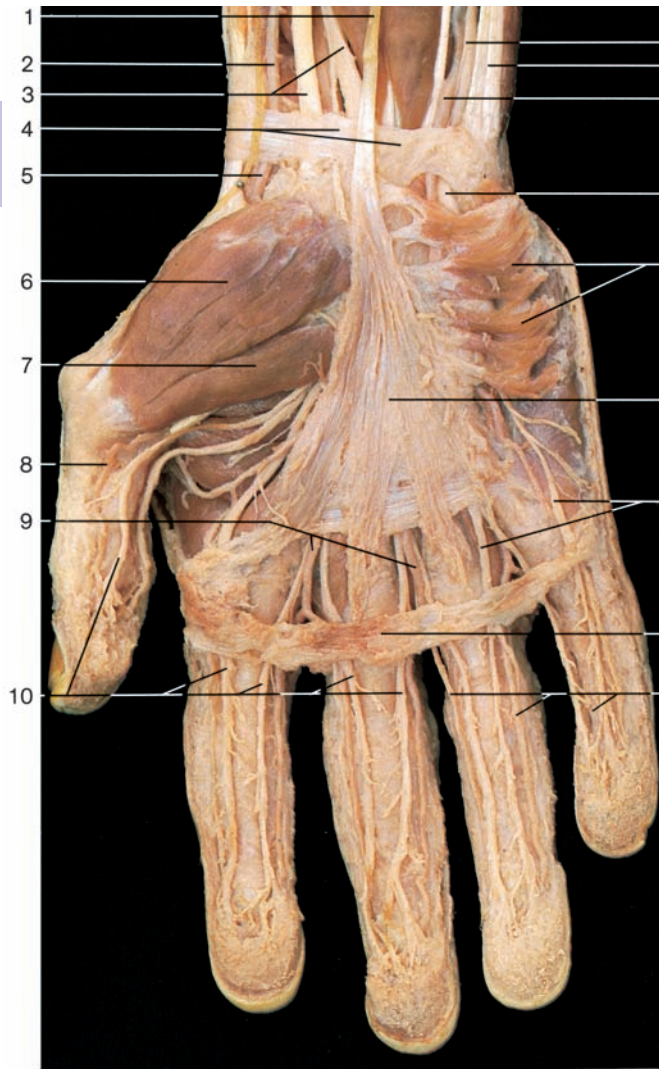
Palm of the right hand, middle layer. The flexor retinaculum has been removed.

- 1 Superficial branch of radial nerve
- 2 Tendon of flexor carpi radialis muscle
- 3 Radial artery
- 4 Median nerve
- 5 Tendon of flexor digitorum superficialis muscle
- 6 Tendon of abductor pollicis longus muscle
- 7 Tendon of extensor pollicis brevis muscle
- 8 Superficial palmar branch of radial artery
- 9 Abductor pollicis brevis muscle
- 10 Superficial head of flexor pollicis brevis muscle
- 11 Terminal branches of superficial branch of radial nerve
- 12 Common palmar digital nerves (median nerve)
- 13 Proper palmar digital arteries of thumb
- 14 Proper palmar digital nerves (median nerve)
- 15 Tendon of flexor carpi ulnaris muscle
- 16 Ulnar artery
- 17 Position of pisiform bone
- 18 Superficial branch of ulnar nerve
- 19 Flexor retinaculum
- 20 Deep branch of ulnar nerve
- 21 Abductor digiti minimi muscle
- 22 Common palmar digital nerve (ulnar nerve)

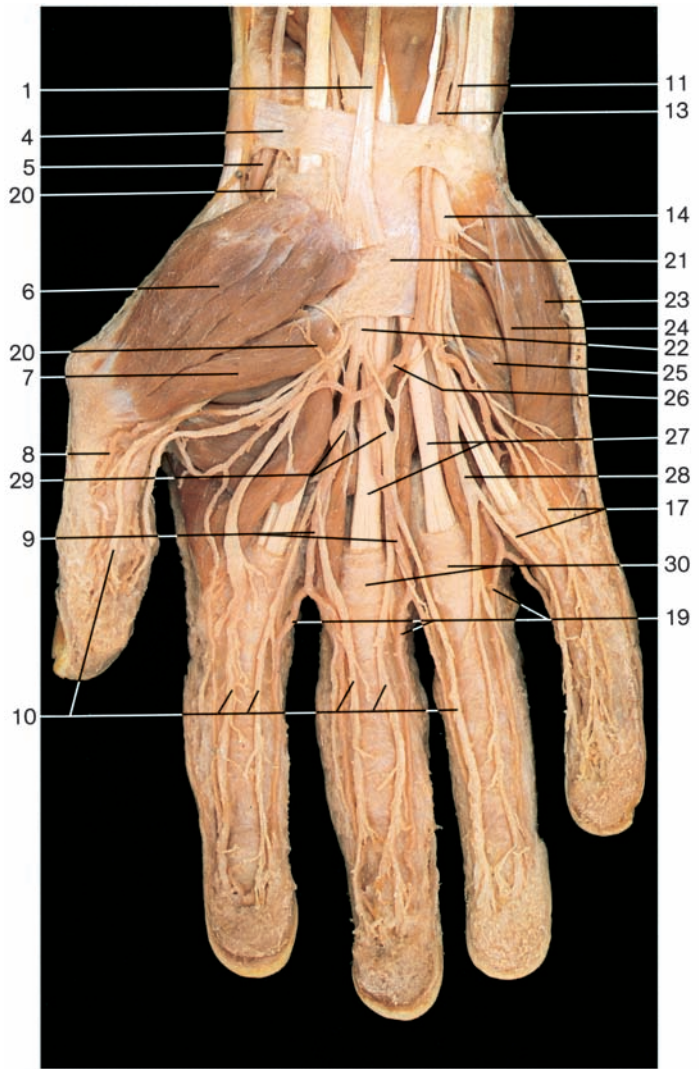


Arteriogram of the right hand (palmar aspect).

- 23 Superficial palmar arch
- 24 Tendons of flexor digitorum muscles
- 25 Common palmar digital arteries
- 26 Palmar digital nerves (ulnar nerve)
- 27 Proper palmar digital arteries
- 28 Carpal tunnel
- 29 Fibrous sheaths for the tendons of flexor digitorum muscles
- 30 Deep palmar arch
- 31 Princeps pollicis artery
- 32 Palmar branch of median nerve
- 33 Common digital palmar artery
- 34 Ulnar nerve
- 35 Capillary network of fingers
- 36 Radius
- 37 Carpal bones
- 38 Metacarpal bone
- 39 Interossei muscles
- 40 Proximal phalanx
- 41 Middle phalanx
- 42 Distal phalanx
- 43 Dorsal branch of ulnar nerve
- 44 Tendons of flexor digitorum profundus (upper) and superficialis (lower) muscles



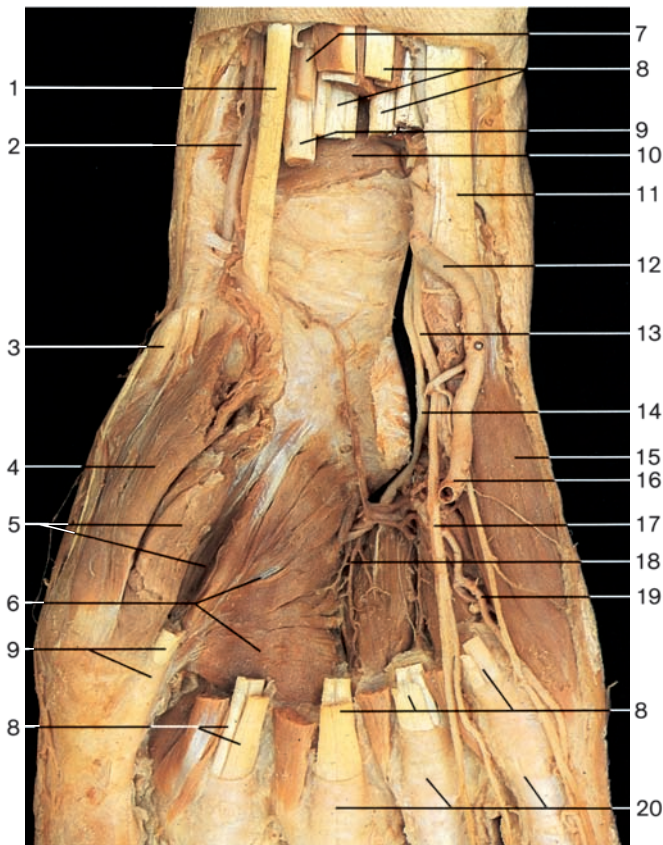
Palm of the right hand, superficial layer. Dissection of vessels and nerves.



Palm of the right hand, superficial layer. Dissection of vessels and nerves. The palmar aponeurosis has been removed to display the superficial palmar arch.

- 1 Tendon of palmaris longus muscle
- 2 Radial artery
- 3 Tendon of flexor carpi radialis muscle and median nerve
- 4 Distal part of antebrachial fascia
- 5 Radial artery passing into the anatomical snuffbox
- 6 Abductor pollicis brevis muscle
- 7 Superficial head of flexor pollicis brevis muscle
- 8 Palmar digital artery of thumb
- 9 Common palmar digital arteries
- 10 Proper palmar digital nerves (median nerve)
- 11 Ulnar nerve
- 12 Tendon of flexor carpi ulnaris muscle
- 13 Ulnar artery
- 14 Superficial branch of ulnar nerve
- 15 Palmaris brevis muscle
- 16 Palmar aponeurosis

- 17 Palmar digital nerves (ulnar nerve)
- 18 Superficial transverse metacarpal ligament
- 19 Proper palmar digital arteries
- 20 Superficial palmar branch of radial artery (contributing to the superficial palmar arch)
- 21 Flexor retinaculum
- 22 Median nerve
- 23 Abductor digiti minimi muscle
- 24 Flexor digiti minimi brevis muscle
- 25 Opponens digiti minimi muscle
- 26 Superficial palmar arch
- 27 Tendons of flexor digitorum superficialis muscle
- 28 Common palmar digital branch of ulnar nerve
- 29 Common palmar digital branches of median nerve
- 30 Fibrous sheaths of tendons of flexor muscles



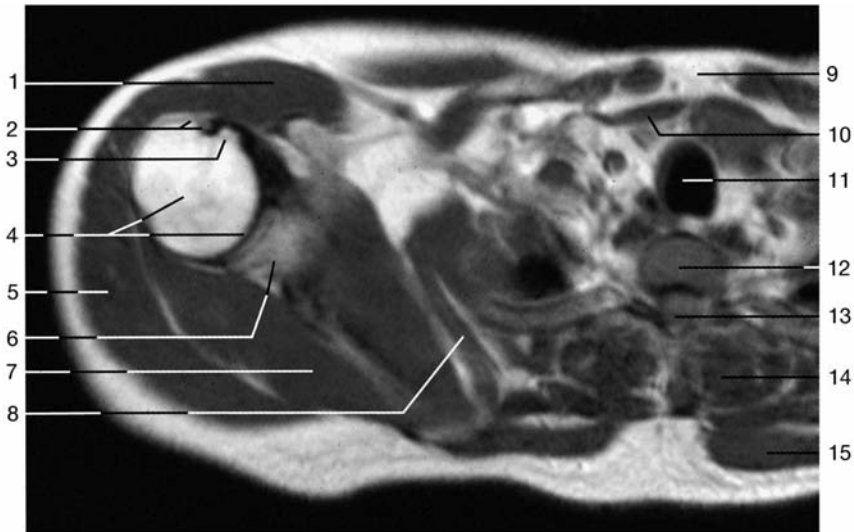
Anterior region of wrist and palm of the right hand, deep layer. The carpal tunnel has been opened, the tendons of the flexor muscles have been removed, and the superficial palmar arch has been cut.



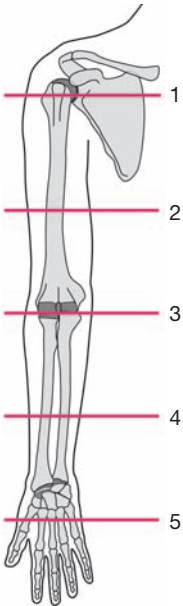
Anterior region of wrist and palm of the right hand, deep layer. Dissection of the deep palmar arch.

- 1 Tendon of flexor carpi radialis muscle
- 2 Radial artery
- 3 Tendon of abductor pollicis longus muscle
- 4 Abductor pollicis brevis muscle
- 5 Superficial and deep heads of flexor pollicis brevis muscle
- 6 Oblique and transverse heads of adductor pollicis muscle
- 7 Median nerve
- 8 Tendons of flexor digitorum superficialis and profundus muscles
- 9 Tendon of flexor pollicis longus muscle
- 10 Pronator quadratus muscle
- 11 Tendon of flexor carpi ulnaris muscle
- 12 Ulnar artery

- 13 Superficial branch of ulnar nerve
- 14 Deep branch of ulnar nerve
- 15 Abductor digiti minimi muscle
- 16 Superficial palmar arch (cut end)
- 17 Common palmar digital nerve (ulnar nerve)
- 18 Palmar metacarpal arteries of deep palmar arch
- 19 Palmar digital artery of the fifth finger
- 20 Fibrous sheaths of tendons of flexor muscles
- 21 Palmar interossei muscles
- 22 Opponens pollicis muscle (cut)
- 23 Deep palmar arch
- 24 First dorsal interosseous muscle
- 25 First lumbrical muscle



Horizontal section through the right shoulder joint. Section 1 (MRI scan, inferior aspect).

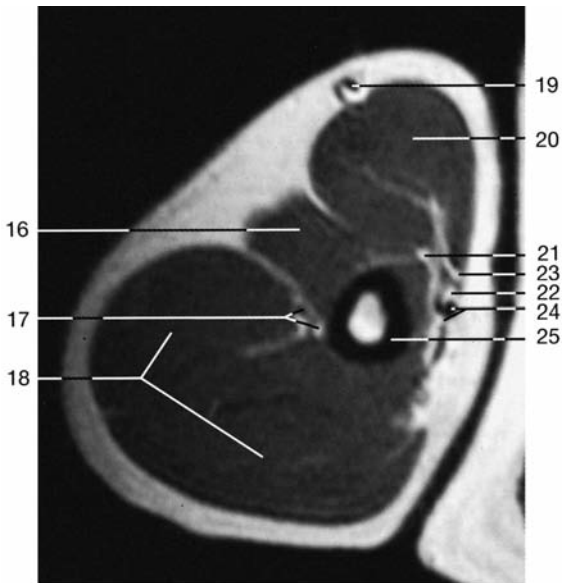


Upper limb, location of sections 1–5 (MRI scans, p. 444: courtesy of Prof. Heuck, Munich, Germany; MRI scans, p. 445: courtesy of Prof. Bautz and Dr. Janka, Univ. Erlangen-Nuremberg, Germany).

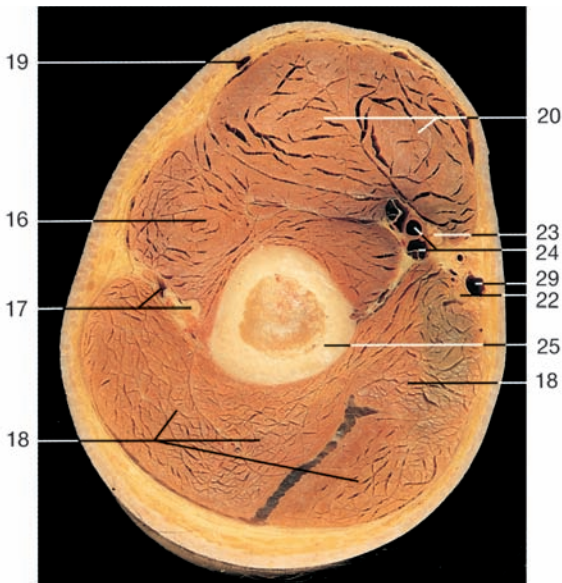


Horizontal section through the right shoulder joint. Section 1 (inferior aspect).
* = Upper lobe of lung.

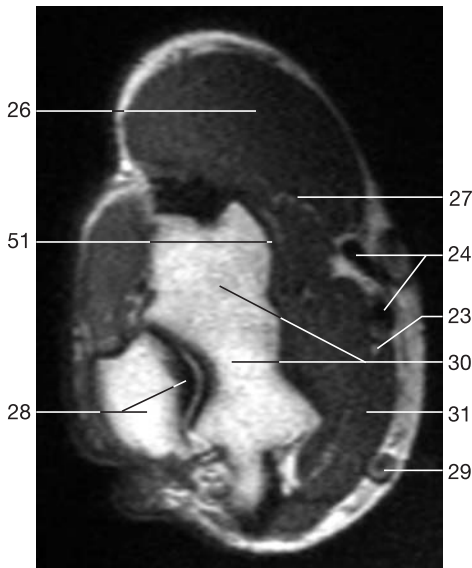
- 1 Pectoralis major muscle
- 2 Greater tubercle and tendon of biceps muscle
- 3 Lesser tubercle
- 4 Head of humerus and articular cavity of shoulder joint
- 5 Deltoid muscle
- 6 Scapula
- 7 Infraspinatus muscle
- 8 Serratus anterior muscle
- 9 Sternum
- 10 Infrahyoid muscles
- 11 Trachea
- 12 Body of thoracic vertebra
- 13 Vertebral canal and spinal cord
- 14 Deep muscles of the back
- 15 Trapezius muscle
- 16 Brachialis muscle
- 17 Radial nerve and profunda brachii artery



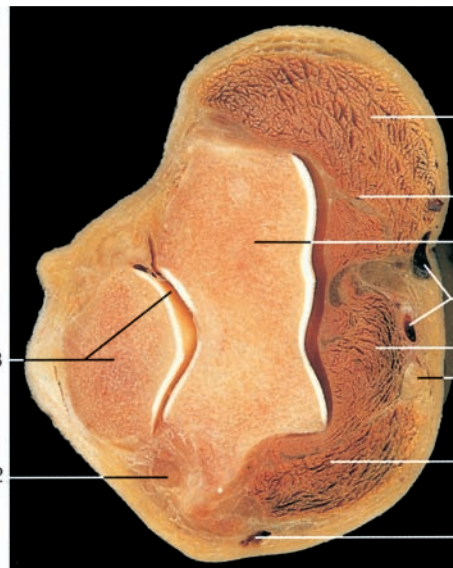
Axial section through the middle of the right arm. Section 2 (MRI scan, inferior aspect).



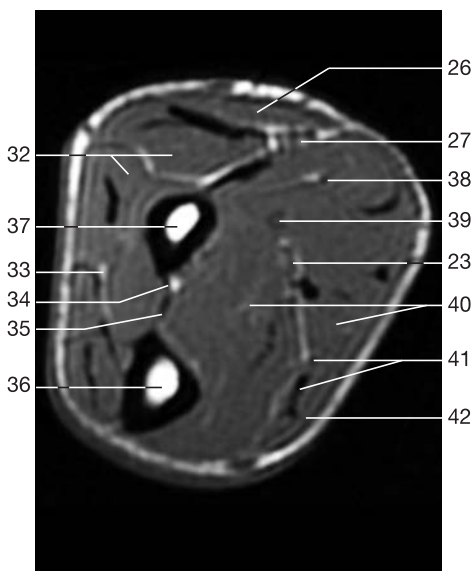
Axial section through the middle of the right arm. Section 2 (inferior aspect).



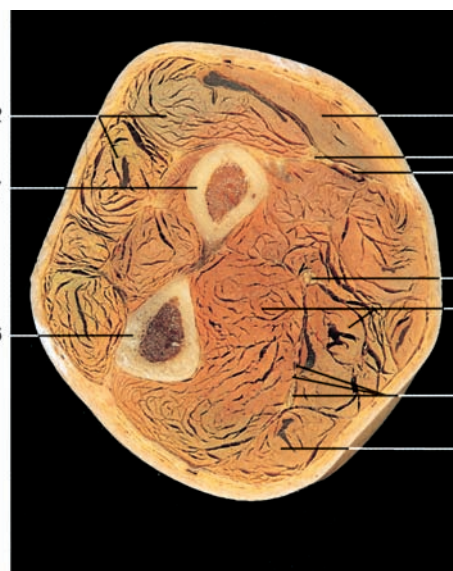
Axial section through the right elbow joint. Section 3 (MRI scan, inferior aspect).



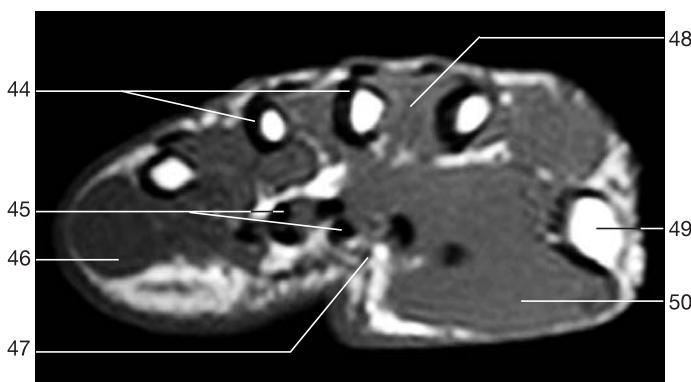
Axial section through the right elbow joint. Section 3 (inferior aspect).



Axial section through the middle of the right forearm. Section 4 (MRI scan, inferior aspect).



Axial section through the middle of the right forearm. Section 4 (inferior aspect).



Axial section through the right hand at the level of the metacarpus. Section 5 (MRI scan, inferior aspect).



Axial section through the right hand at the level of the metacarpus. Section 5 (inferior aspect).

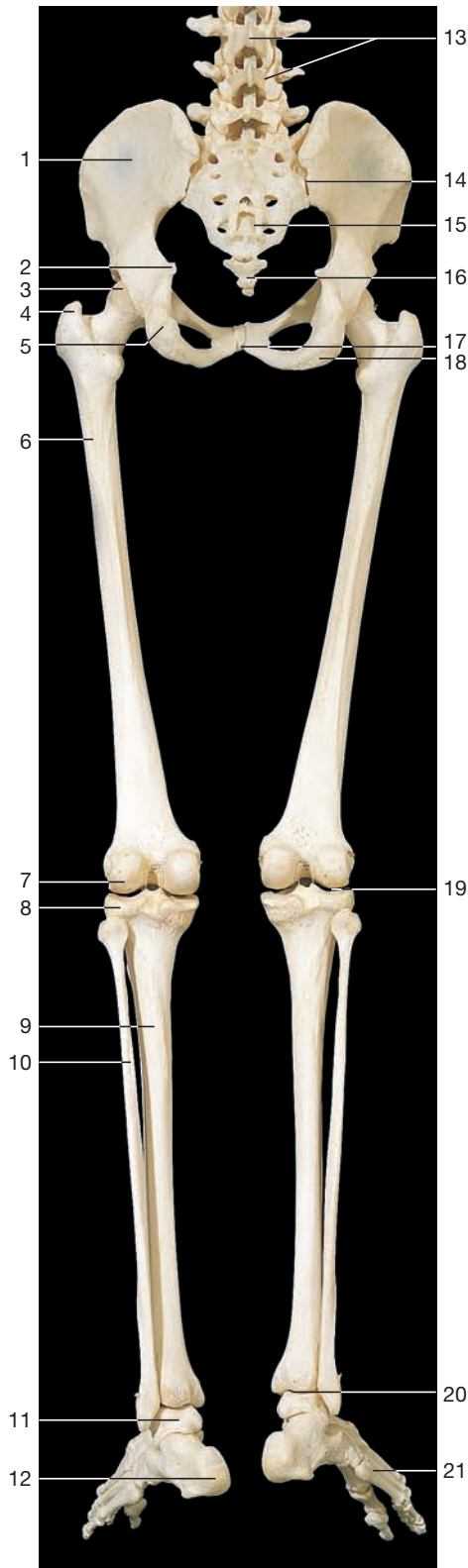
- 18 Triceps brachii muscle
- 19 Cephalic vein
- 20 Biceps brachii muscle
- 21 Musculocutaneous nerve
- 22 Ulnar nerve
- 23 Median nerve
- 24 Brachial artery and vein
- 25 Shaft of humerus
- 26 Brachioradialis muscle
- 27 Radial nerve
- 28 Olecranon and articular cavity of elbow joint
- 16 Basilic vein
- 23 Humerus
- 31 Pronator teres muscle
- 32 Extensor muscles of forearm
- 33 Deep branch of radial nerve
- 34 Anterior interosseus artery and nerve
- 35 Interosseous membrane
- 36 Ulna
- 37 Radius
- 38 Superficial branch of radial artery
- 39 Flexor pollicis longus muscle
- 40 Flexor digitorum superficialis and profundus muscles
- 41 Ulnar nerve, artery, and vein
- 42 Flexor carpi ulnaris muscle
- 43 Radial artery
- 44 Third and fourth metacarpal bones
- 45 Carpal tunnel with tendons of flexor digitorum muscles
- 46 Hypothenar muscles
- 47 Median nerve
- 23 Interossei muscles
- 40 First metacarpal bone
- 49 Thenar muscles
- 51 Articular cavity of humeroradial joint



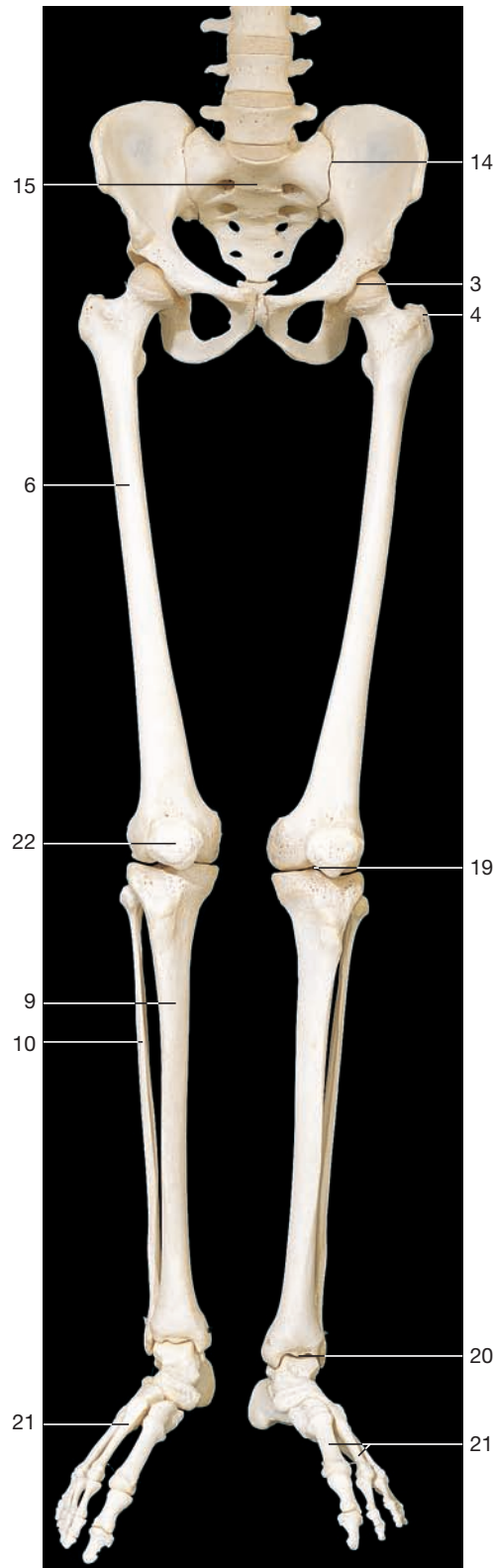
8 Lower Limb

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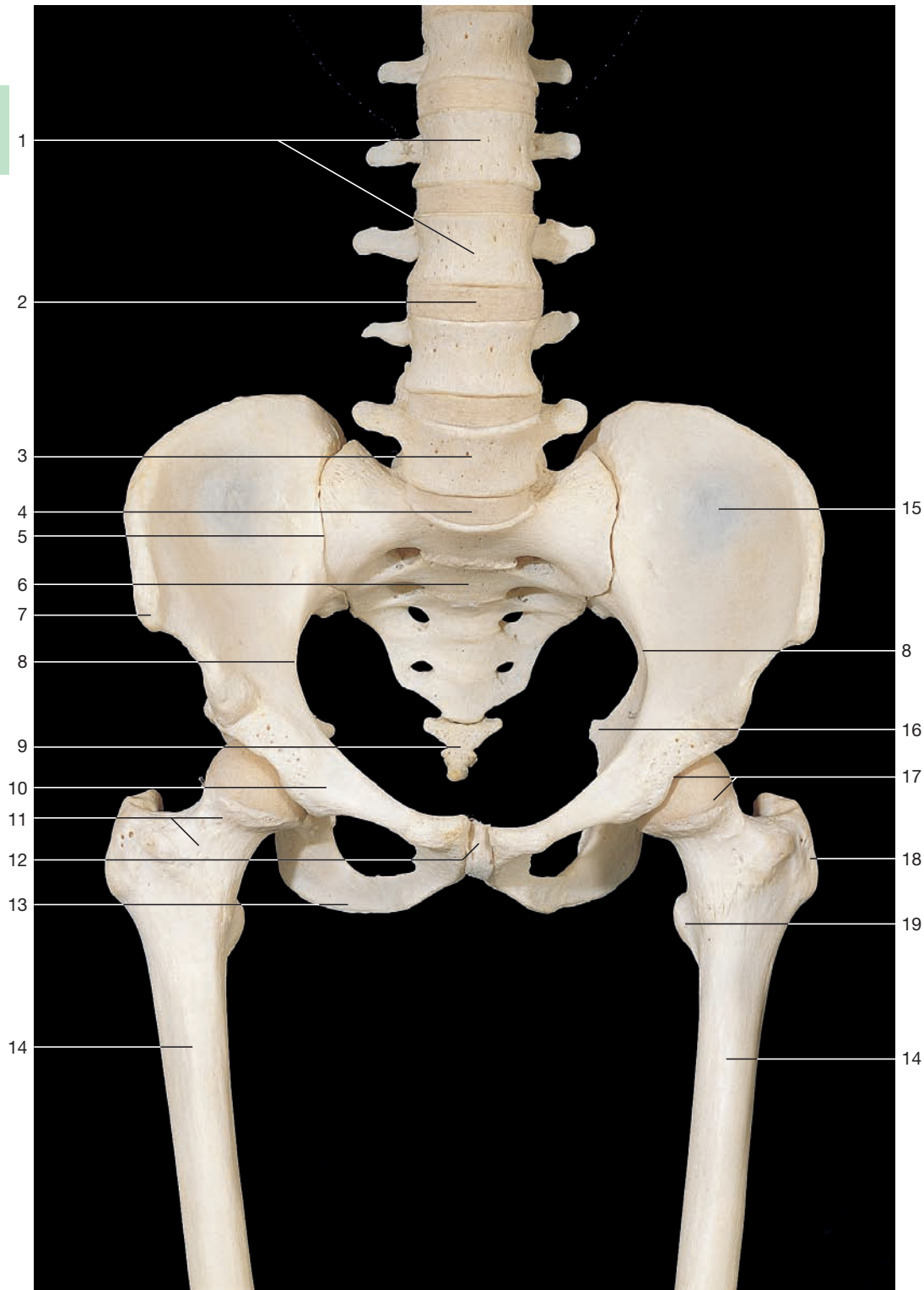


Skeleton of pelvic girdle and lower limb (posterior aspect).



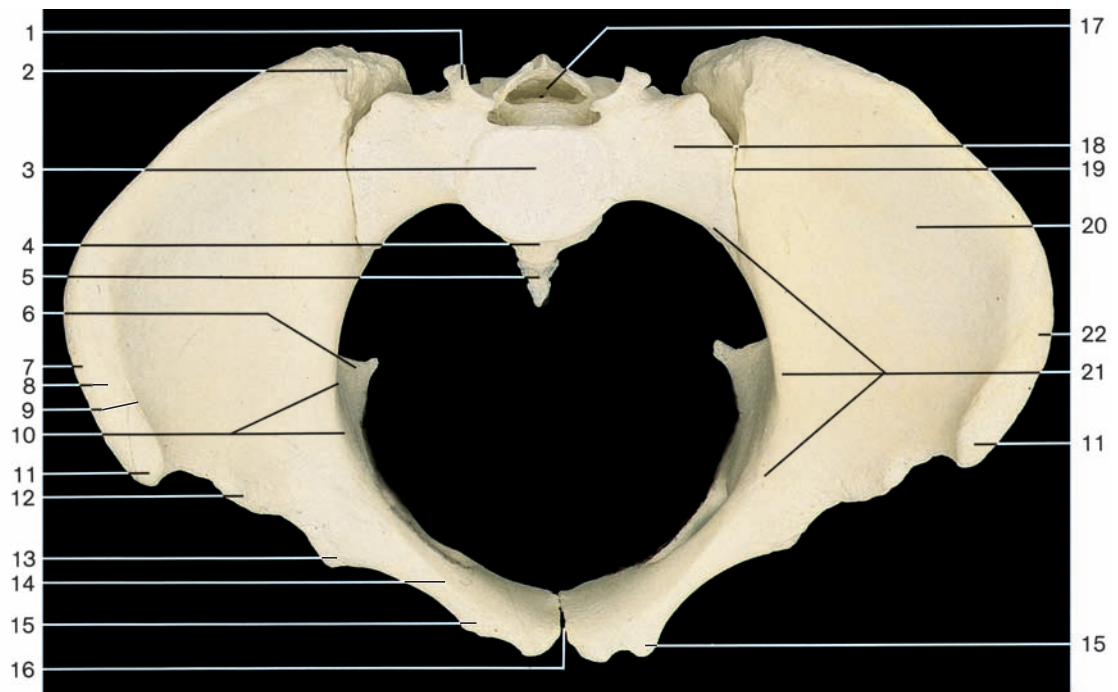
Skeleton of pelvic girdle and lower limb (anterior aspect).

- | | | |
|----------------------------|----------------------|-----------------------|
| 1 Ilium | 9 Tibia | 17 Pubic symphysis |
| 2 Ischial spine | 10 Fibula | 18 Ischial tuberosity |
| 3 Hip joint | 11 Talus | 19 Knee joint |
| 4 Greater trochanter | 12 Calcaneus | 20 Ankle joint |
| 5 Ischial tuberosity | 13 Lumbar vertebrae | 21 Metatarsal bones |
| 6 Femur | 14 Sacro-iliac joint | 22 Patella |
| 7 Lateral condyle of femur | 15 Sacrum | |
| 8 Lateral condyle of tibia | 16 Coccyx | |



Lumbar vertebrae and skeleton of pelvic girdle with both femurs (anterior aspect).

- | | |
|--|--|
| 1 Second and third lumbar vertebrae | 11 Neck of femur |
| 2 Intervertebral disc | 12 Pubic symphysis |
| 3 Fifth lumbar vertebra | 13 Ischial tuberosity |
| 4 Intervertebral disc between fifth lumbar vertebra and sacrum | 14 Femur |
| 5 Sacro-iliac joint | 15 Iliac fossa |
| 6 Sacrum | 16 Ischial spine |
| 7 Anterior superior iliac spine | 17 Head of femur (and localization of hip joint) |
| 8 Linea terminalis | 18 Greater trochanter |
| 9 Coccyx | 19 Lesser trochanter |
| 10 Pubis | |

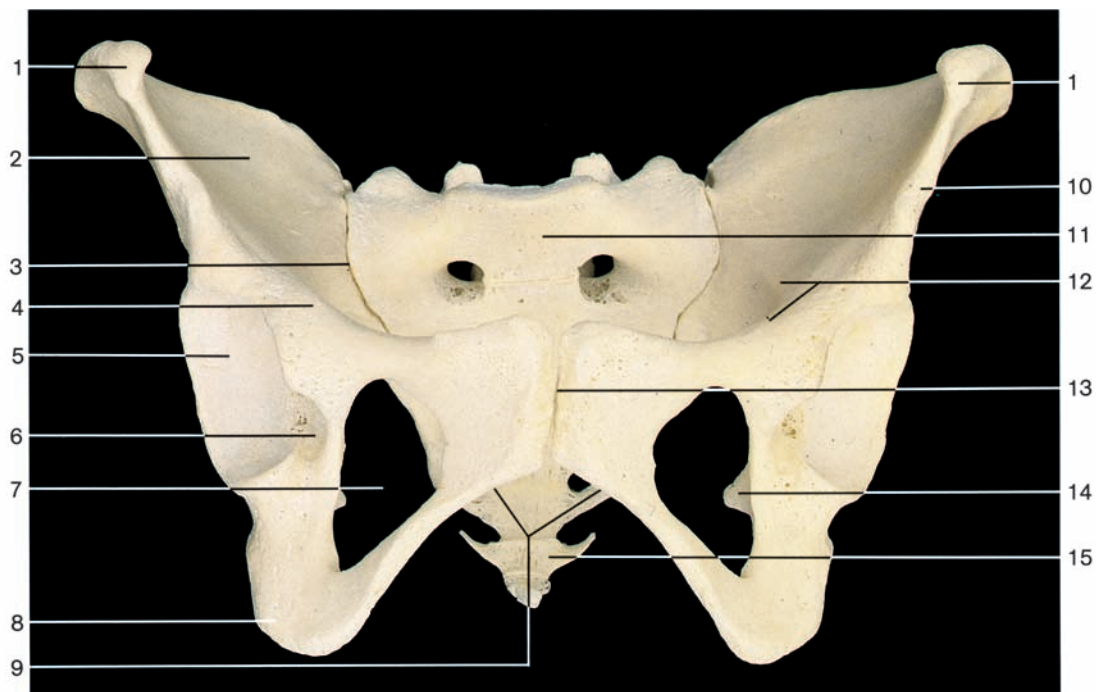


Female pelvis (superior aspect). Note the differences between the male and female pelvis, predominantly in the form and dimensions of the sacrum, the superior and inferior apertures, and the alae of the ilium.

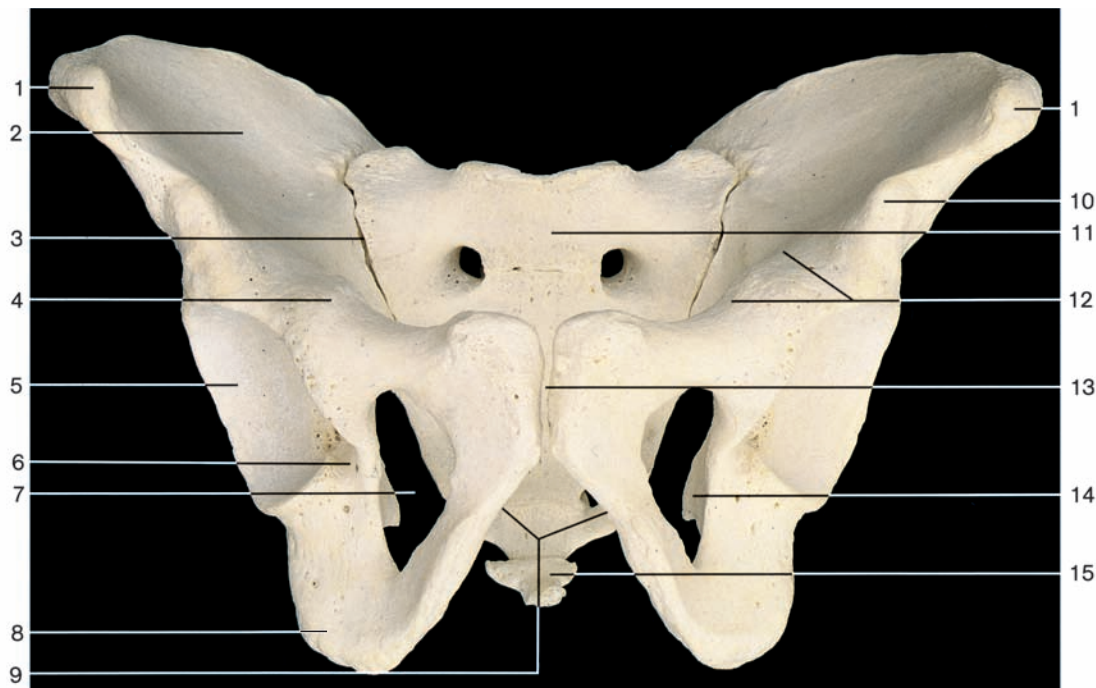


Male pelvis (superior aspect). Compare with the female pelvis (depicted above).

- | | |
|--|----------------------------------|
| 1 Superior articular process of sacrum | 12 Anterior inferior iliac spine |
| 2 Posterior superior iliac spine | 13 Iliopubic eminence |
| 3 Base of sacrum | 14 Pecten pubis |
| 4 Sacral promontory | 15 Pubic tubercle |
| 5 Coccyx | 16 Pubic symphysis |
| 6 Ischial spine | 17 Sacral canal |
| 7 External lip of iliac crest | 18 Ala of sacrum |
| 8 Intermediate line of iliac crest | 19 Position of sacro-iliac joint |
| 9 Internal lip of iliac crest | 20 Iliac fossa |
| 10 Arcuate line | 21 Linea terminalis |
| 11 Anterior superior iliac spine | 22 Iliac crest |

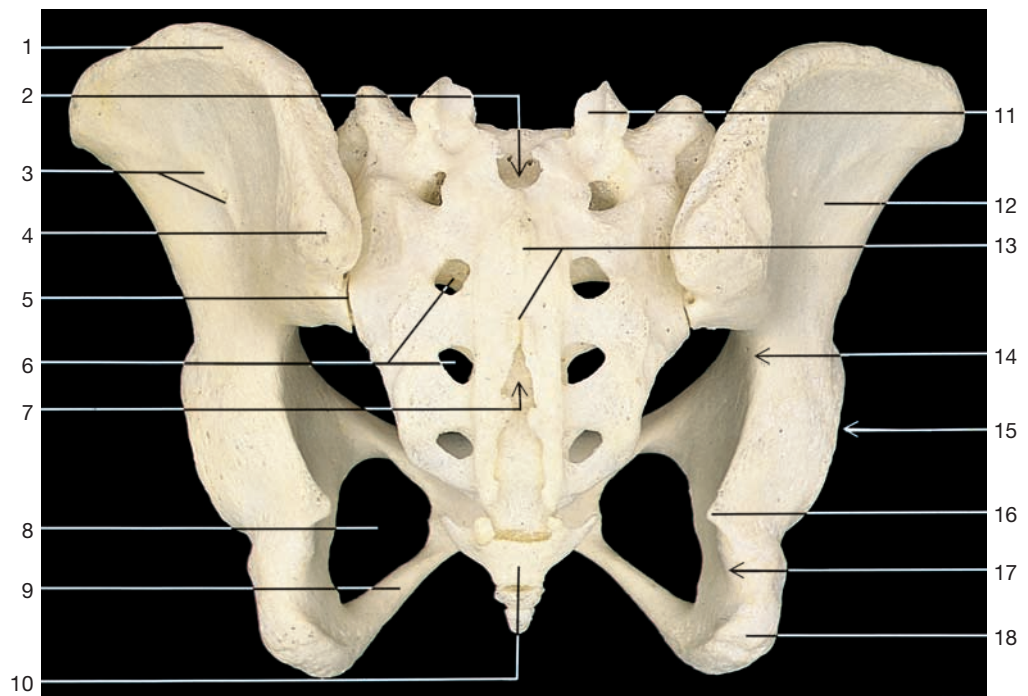


Female pelvis (anterior aspect). Note the differences between the form and dimensions of the male and female pelvis. The female pubic arch is wider than the male. The obturator foramen in the female pelvis is triangular, while that in the male pelvis is ovoid.



Male pelvis (anterior aspect). Compare with the female pelvis (depicted above).

- | | |
|---------------------------------|--|
| 1 Anterior superior iliac spine | 9 Pubic arch |
| 2 Iliac fossa | 10 Anterior inferior iliac spine |
| 3 Position of sacro-iliac joint | 11 Sacrum |
| 4 Iliopubic eminence | 12 Linea terminalis (at margin of superior aperture) |
| 5 Lunate surface of acetabulum | 13 Pubic symphysis |
| 6 Acetabular notch | 14 Ischial spine |
| 7 Obturator foramen | 15 Coccyx |
| 8 Ischial tuberosity | |



Female pelvis (posterior aspect). Note the differences between the female and male pelvis, especially with respect to the inferior aperture, the shape of the sacrum, the two sciatic notches, and the pubic arch.

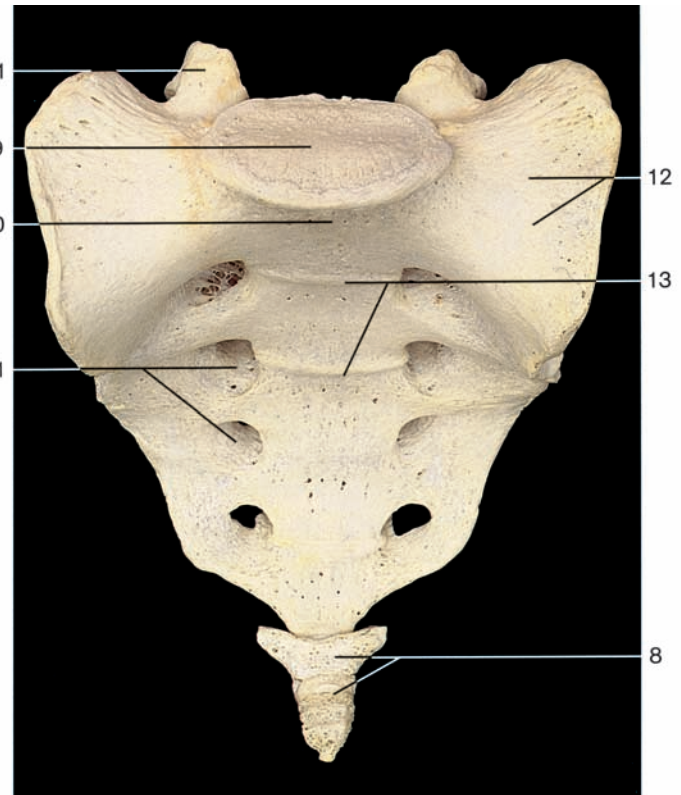


Male pelvis (posterior aspect). Compare with the female pelvis (depicted above).

- | | |
|----------------------------------|---|
| 1 Iliac crest | 10 Coccyx |
| 2 Sacral canal | 11 Superior articular process of sacrum |
| 3 Posterior gluteal line | 12 Gluteal surface of ilium |
| 4 Posterior superior iliac spine | 13 Median sacral crest |
| 5 Position of sacro-iliac joint | 14 Greater sciatic notch |
| 6 Dorsal sacral foramina | 15 Position of acetabulum |
| 7 Sacral hiatus | 16 Ischial spine |
| 8 Obturator foramen | 17 Lesser sciatic notch |
| 9 Ramus of ischium | 18 Ischial tuberosity |



Sacrum (posterior aspect).

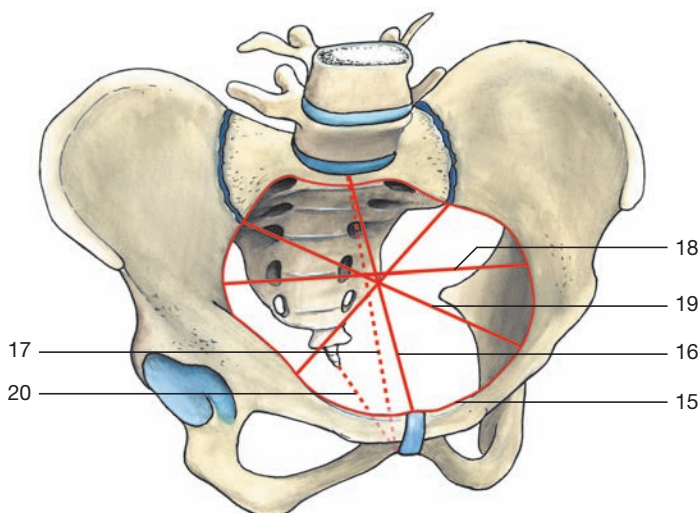


Sacrum (anterior aspect).



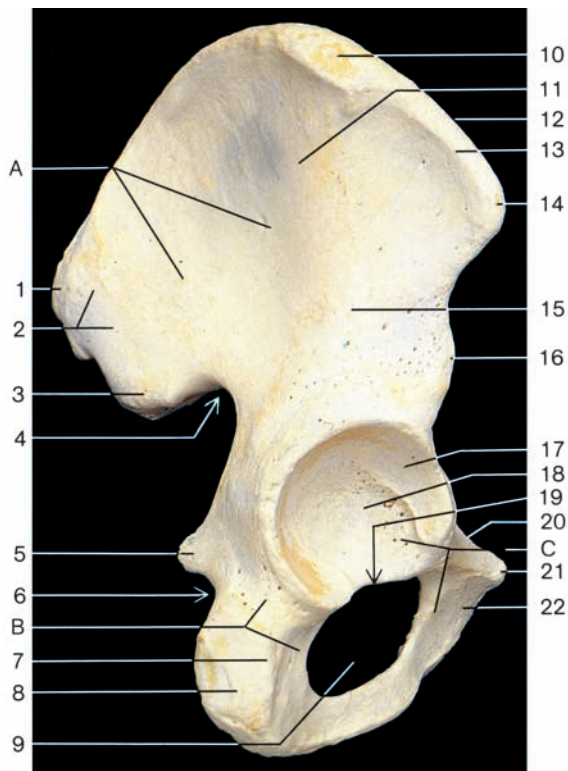
Sacrum (superior aspect).

- 1 Superior articular process of sacrum
- 2 Posterior sacral foramina
- 3 Sacral hiatus
- 4 Median sacral crest
- 5 Lateral sacral crest
- 6 Sacral tuberosity
- 7 Intermediate sacral crest
- 8 Coccyx
- 9 Base of sacrum
- 10 Sacral promontory
- 11 Anterior sacral foramina
- 12 Lateral part of sacrum (ala)
- 13 Transverse line of sacrum
- 14 Sacral canal
- 15 Linea terminalis
- 16 True conjugate
- 17 Diagonal conjugate
- 18 Transverse diameter
- 19 Oblique diameter
- 20 Inferior pelvic aperture or outlet

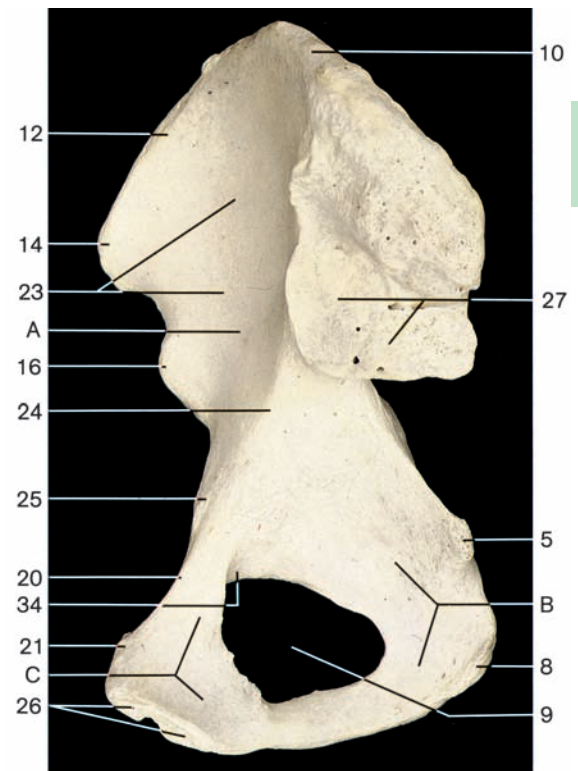


Diameters of pelvis (oblique-superior aspect).

The pelvic girdle is firmly connected to the vertebral column at the sacro-iliac joint. Therefore, the body can be kept upright more easily even if only one limb is used for support (as in walking). The mobility of the lower limb is more limited than that of the upper limb.

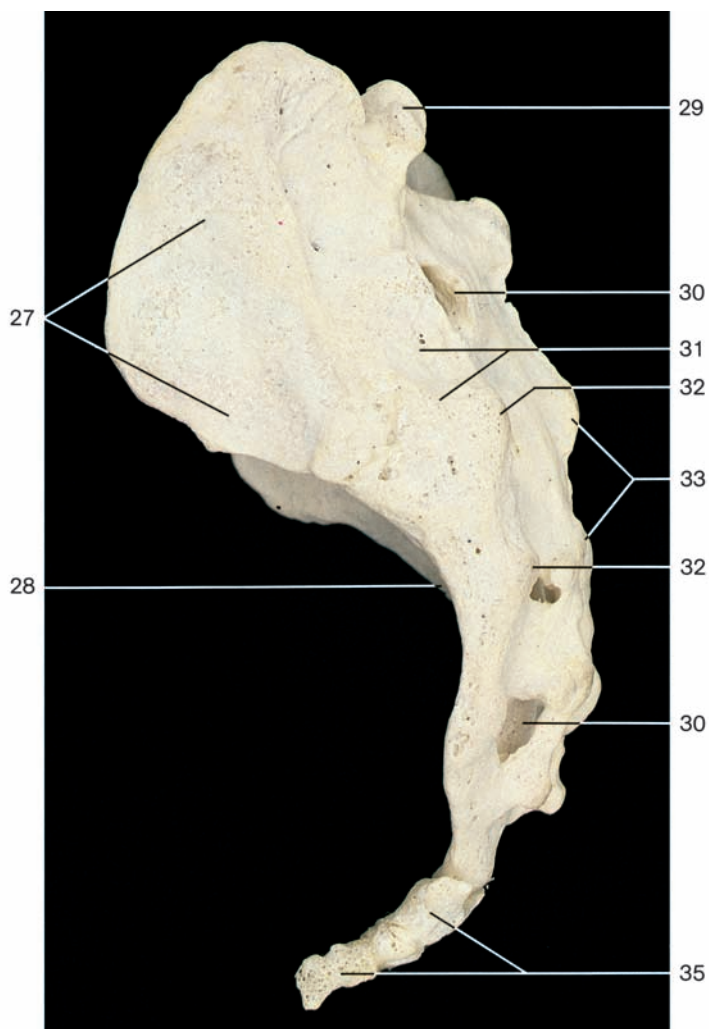


Right hip bone (lateral aspect).



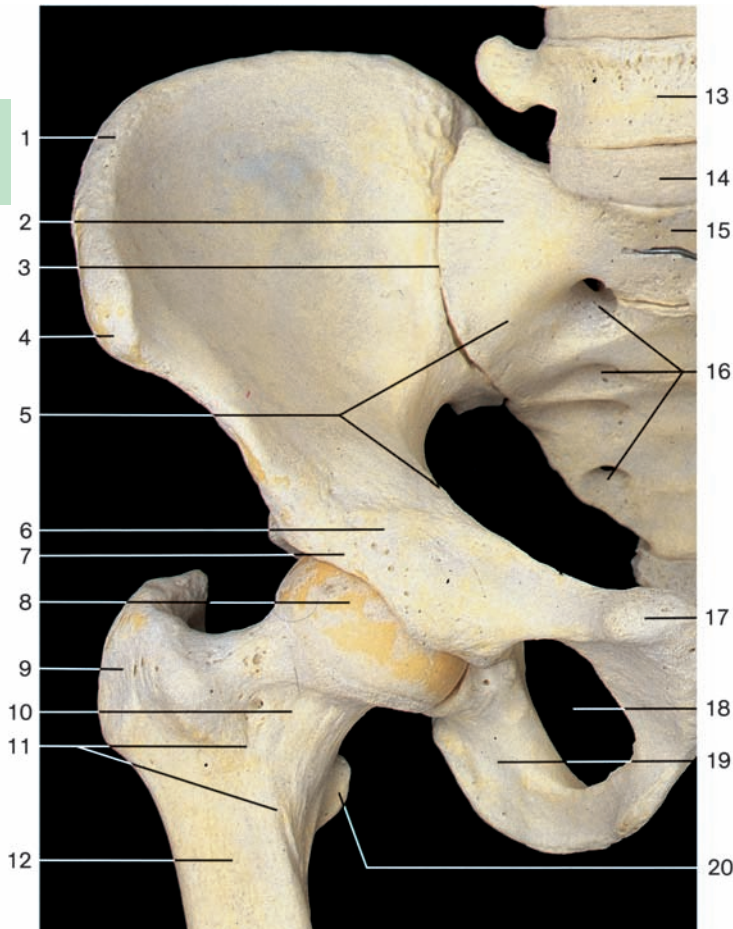
Right hip bone (medial aspect).

A = Ilium
B = Ischium
C = Pubis

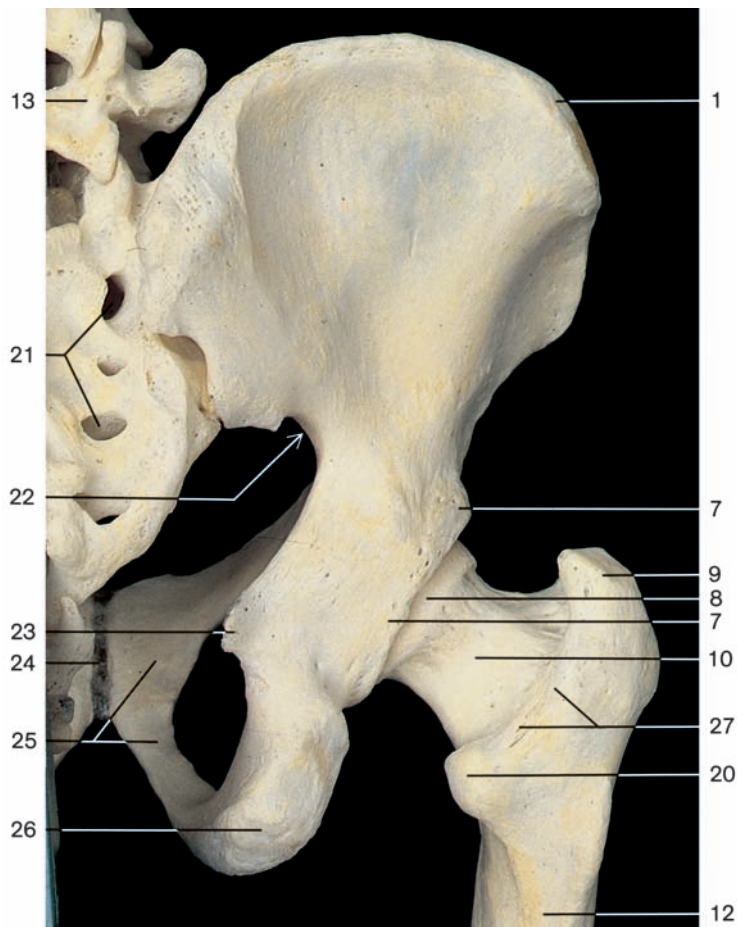


Sacrum and coccyx (lateral aspect).

- 1 Posterior superior iliac spine
- 2 Posterior gluteal line
- 3 Posterior inferior iliac spine
- 4 Greater sciatic notch
- 5 Ischial spine
- 6 Lesser sciatic notch
- 7 Body of ischium
- 8 Ischial tuberosity
- 9 Obturator foramen
- 10 Iliac crest
- 11 Anterior gluteal line
- 12 Internal lip of iliac crest
- 13 External lip of iliac crest
- 14 Anterior superior iliac spine
- 15 Inferior gluteal line
- 16 Anterior inferior iliac spine
- 17 Lunate surface of acetabulum
- 18 Acetabular fossa
- 19 Acetabular notch
- 20 Pecten pubis
- 21 Pubic tubercle
- 22 Body of pubis
- 23 Iliac fossa
- 24 Arcuate line
- 25 Iliopubic eminence
- 26 Symphyseal surface of pubis
- 27 Auricular surface
- 28 Pelvic surface of sacrum
- 29 Superior articular process of sacrum
- 30 Dorsal sacral foramina
- 31 Sacral tuberosity
- 32 Lateral sacral crest
- 33 Median sacral crest
- 34 Obturator groove
- 35 Coccyx



Bones of the right hip joint (anterior aspect).

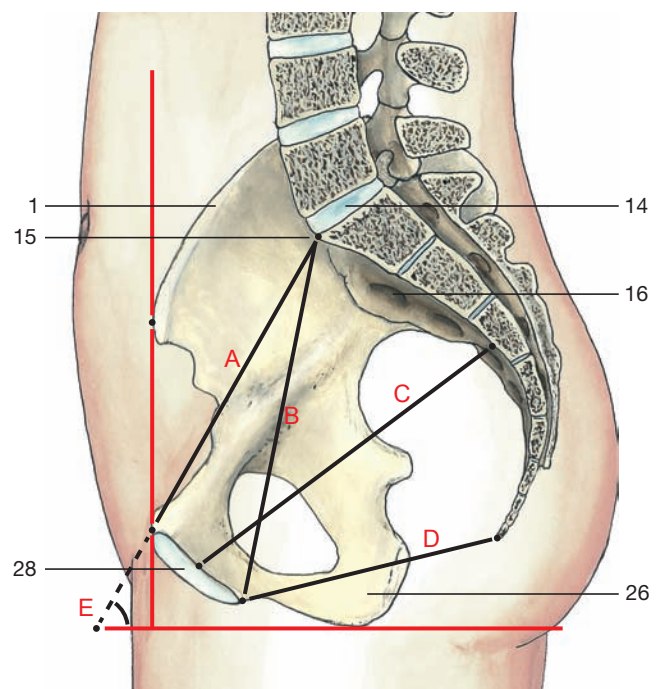


Bones of the right hip joint (posterior aspect).

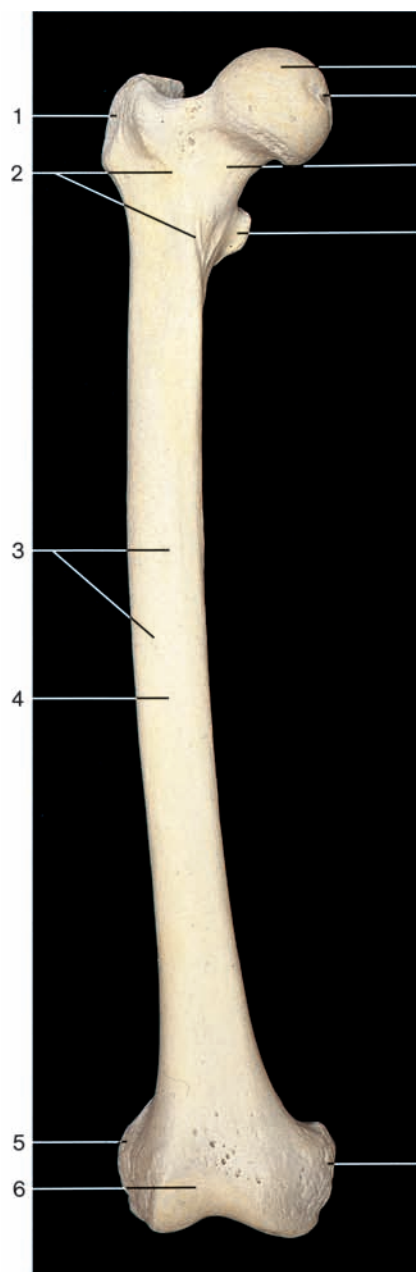
- 1 Iliac crest
- 2 Lateral part of sacrum (ala)
- 3 Position of sacro-iliac joint
- 4 Anterior superior iliac spine
- 5 Linea terminalis
- 6 Iliopubic eminence
- 7 Bony margin of acetabulum
- 8 Head of femur
- 9 Greater trochanter
- 10 Neck of femur
- 11 Intertrochanteric line
- 12 Shaft of femur
- 13 Fifth lumbar vertebra
- 14 Intervertebral disc between fifth lumbar vertebra and sacrum (imitation)
- 15 Sacral promontory
- 16 Anterior sacral foramina
- 17 Pubic tubercle
- 18 Obturator foramen
- 19 Ramus of ischium
- 20 Lesser trochanter
- 21 Posterior sacral foramina
- 22 Greater sciatic notch
- 23 Ischial spine
- 24 Pubic symphysis
- 25 Pubis
- 26 Ischial tuberosity
- 27 Intertrochanteric crest
- 28 Symphyseal surface

Diameters of the pelvis

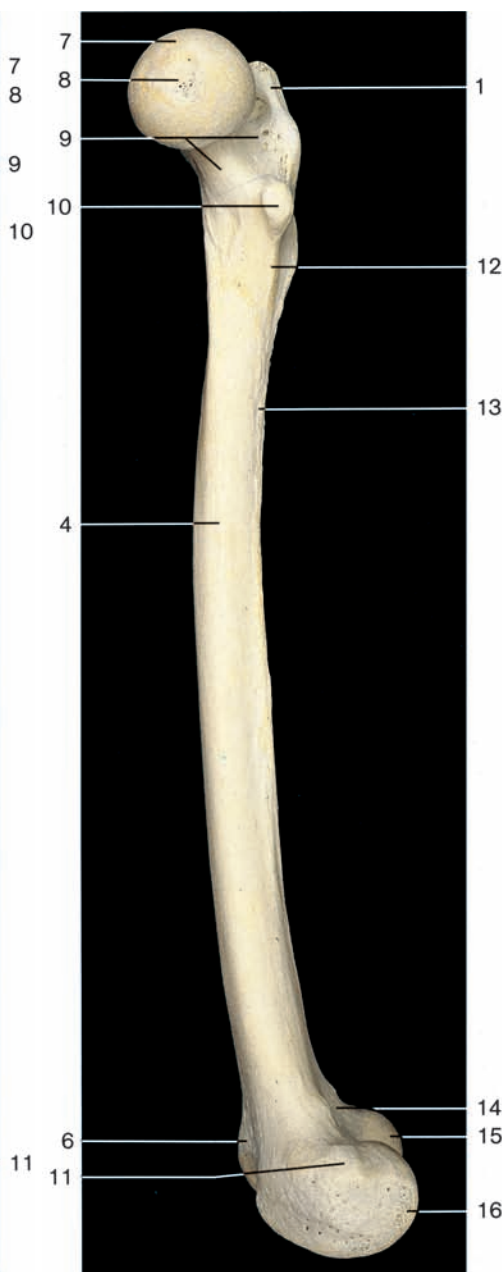
- A = True conjugate (11–11.5 cm) (conjugata vera)
- B = Diagonal conjugate (12.5–13 cm)
- C = Largest diameter of pelvis
- D = Inferior pelvic aperture
- E = Pelvic inclination (60°)



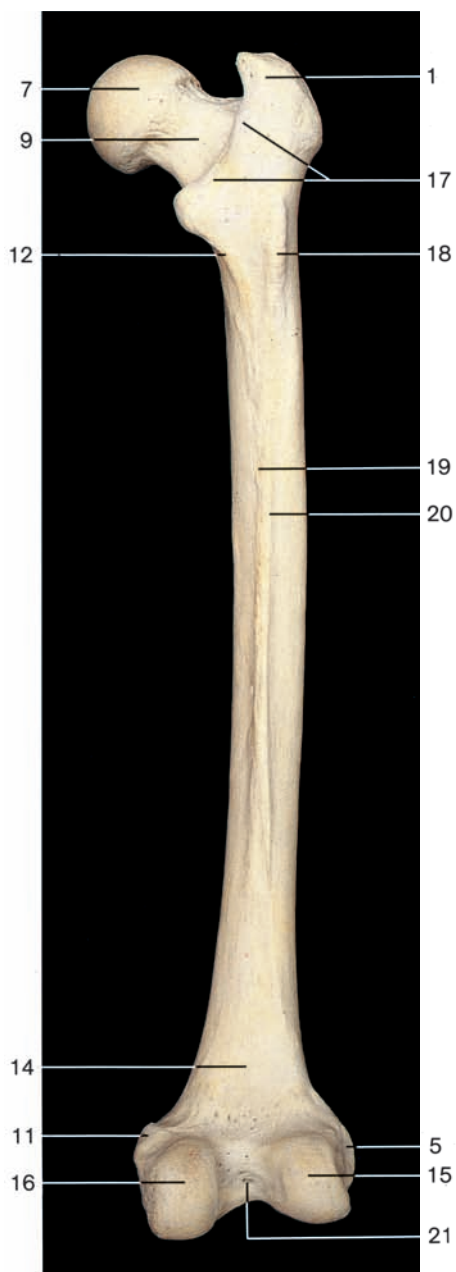
Inclination and diameters of the female pelvis, right half (medial aspect).



Right femur (anterior aspect).



Right femur (medial aspect).



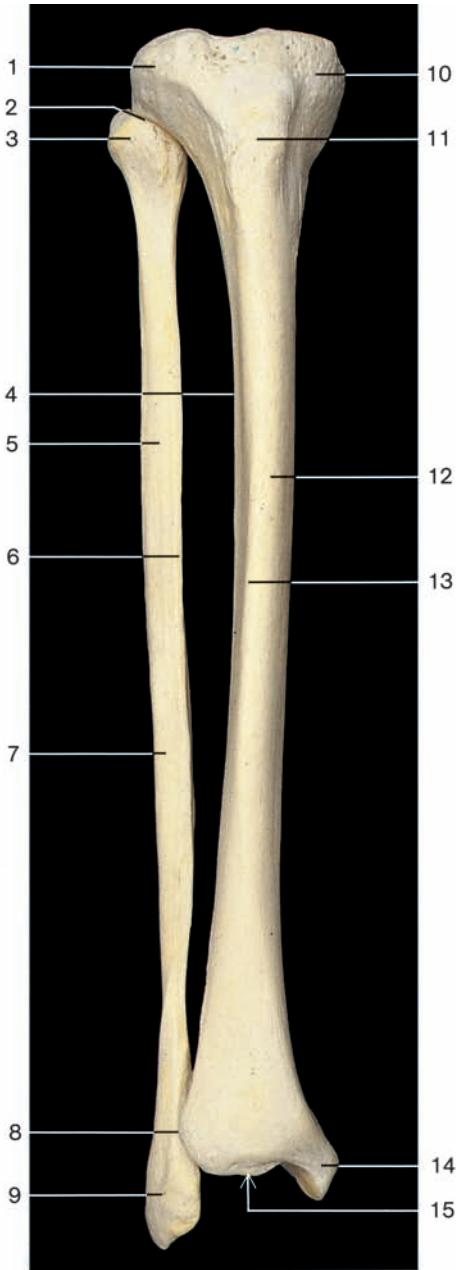
Right femur (posterior aspect).

- 1 Greater trochanter
- 2 Intertrochanteric line
- 3 Nutrient foramina
- 4 Shaft of femur (diaphysis)
- 5 Lateral epicondyle
- 6 Patellar surface
- 7 Head

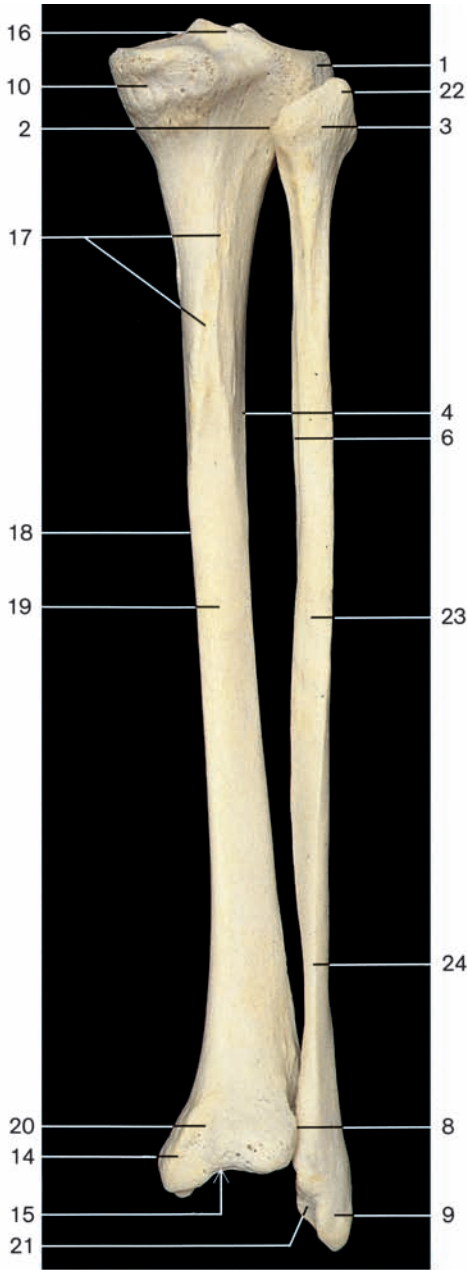
- 8 Fovea of head
- 9 Neck
- 10 Lesser trochanter
- 11 Medial epicondyle
- 12 Pectineal line
- 13 Linea aspera
- 14 Popliteal surface

- 15 Lateral condyle
- 16 Medial condyle
- 17 Intertrochanteric crest
- 18 Third trochanter
- 19 Medial lip of linea aspera
- 20 Lateral lip of linea aspera
- 21 Intercondylar fossa



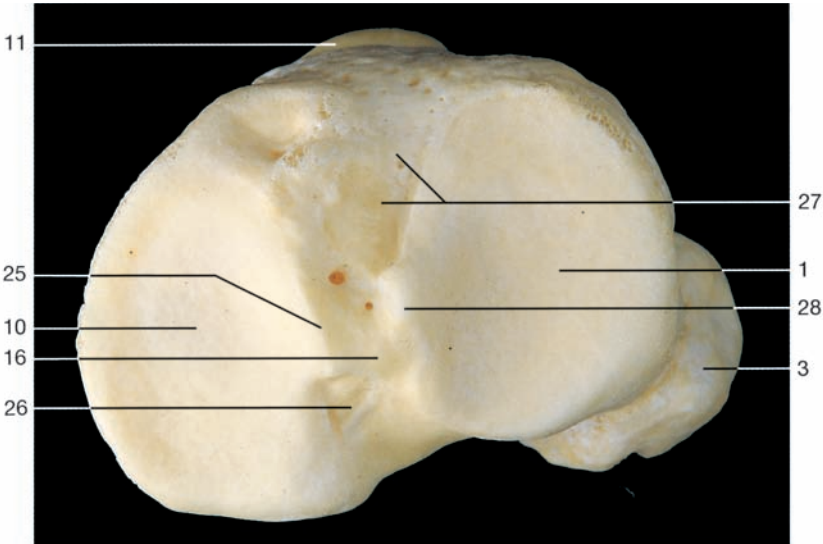


Bones of the leg. Right tibia and fibula (anterior aspect).

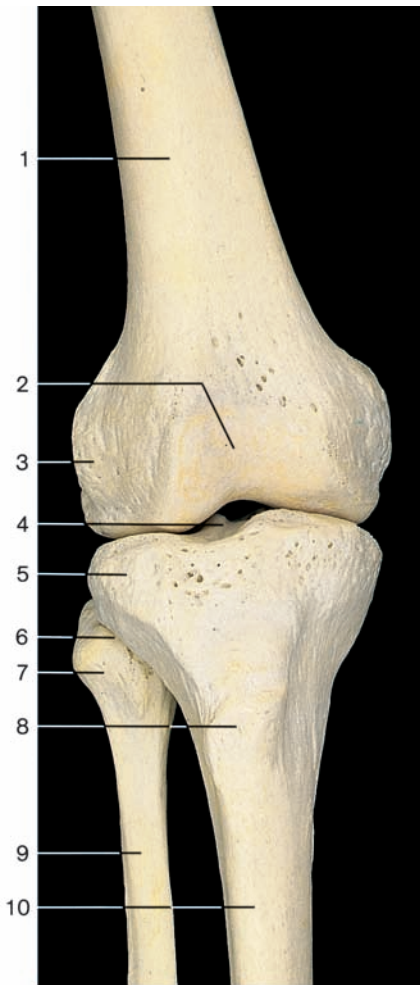


Bones of the leg. Right tibia and fibula (posterior aspect).

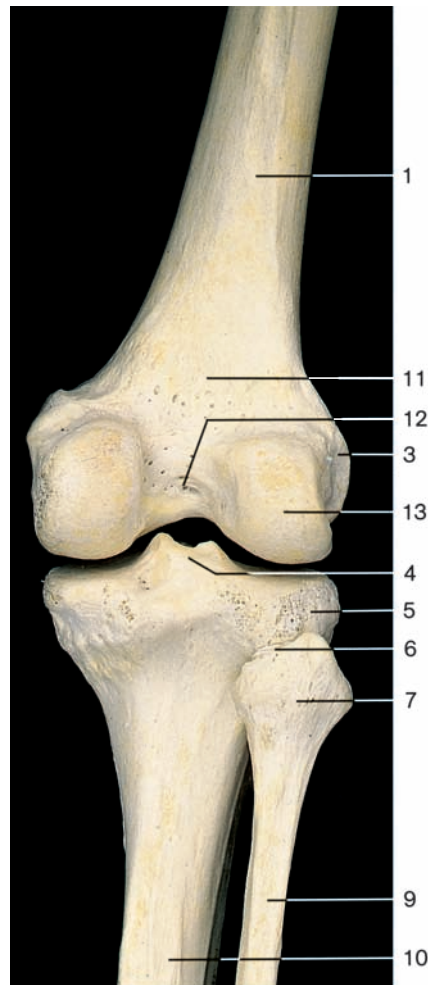
- 1 Lateral condyle of tibia
- 2 Position of tibiofibular joint
- 3 Head of fibula
- 4 Interosseous border of tibia
- 5 Shaft of fibula
- 6 Interosseous border of fibula
- 7 Lateral surface of fibula
- 8 Position of tibiofibular syndesmosis
- 9 Lateral malleolus
- 10 Medial condyle of tibia
- 11 Tuberosity of tibia
- 12 Shaft of tibia (diaphysis)
- 13 Anterior margin of tibia
- 14 Medial malleolus
- 15 Inferior articular surface of tibia
- 16 Intercondylar eminence
- 17 Soleal line
- 18 Medial border of tibia
- 19 Posterior surface of tibia
- 20 Malleolar sulcus of tibia
- 21 Malleolar articular surface of fibula
- 22 Apex of head of fibula
- 23 Posterior surface of fibula
- 24 Posterior border of fibula
- 25 Medial intercondylar tubercle
- 26 Posterior intercondylar area
- 27 Anterior intercondylar area
- 28 Lateral intercondylar tubercle



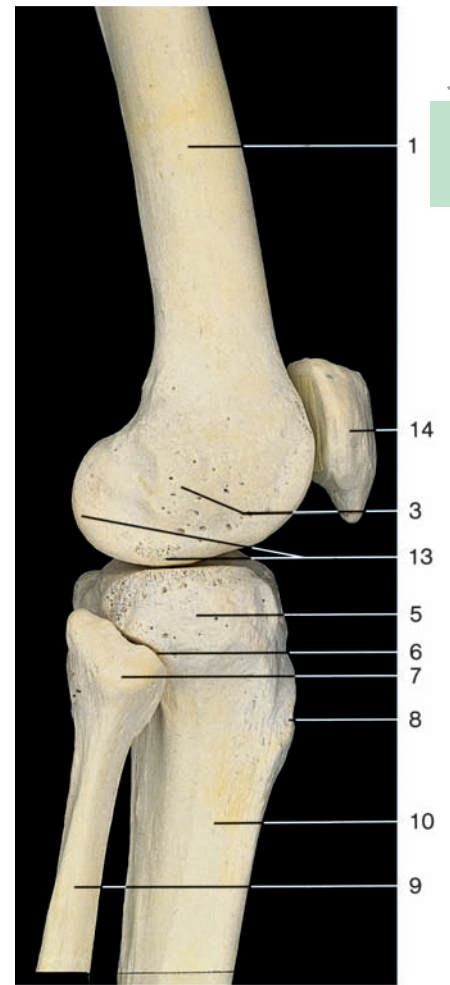
Upper end of the right tibia with fibula (from above), anterior margin of tibia above. Superior articular surface of tibia.



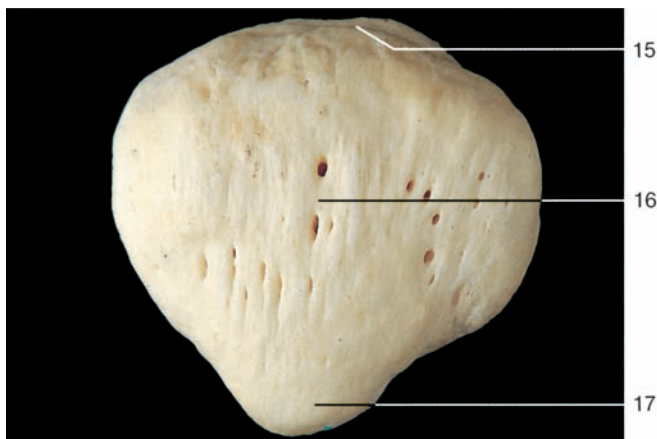
Bones of the right knee joint
(anterior aspect).



Bones of the right knee joint
(posterior aspect).



Bones of the right knee joint
(lateral aspect).



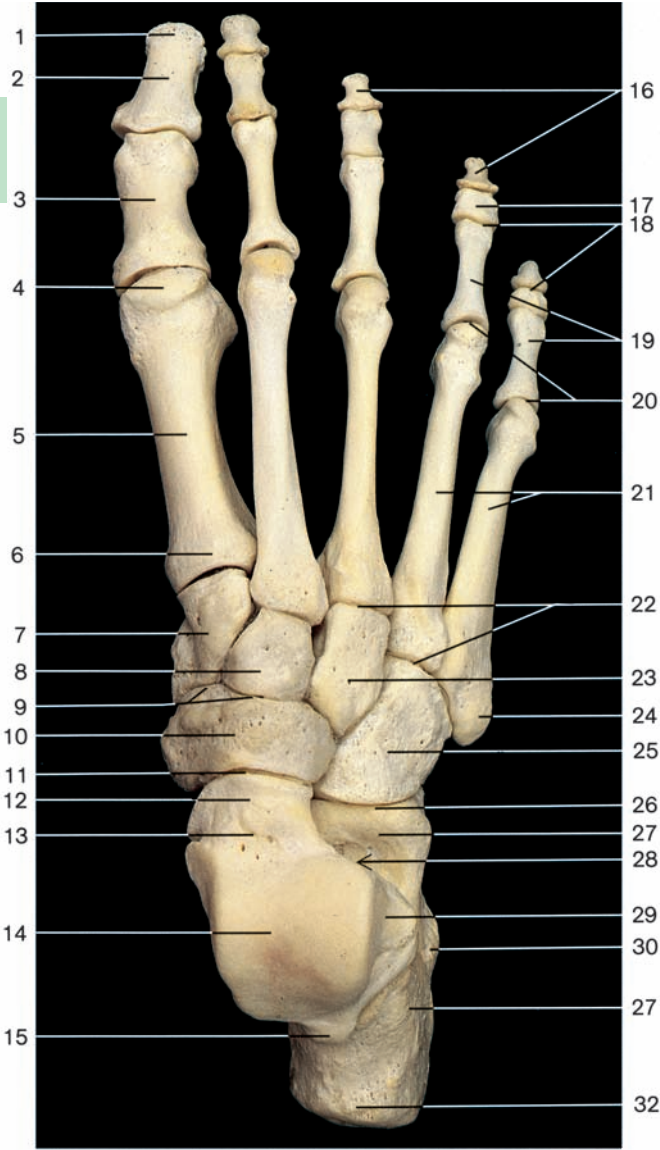
Right patella (anterior aspect).



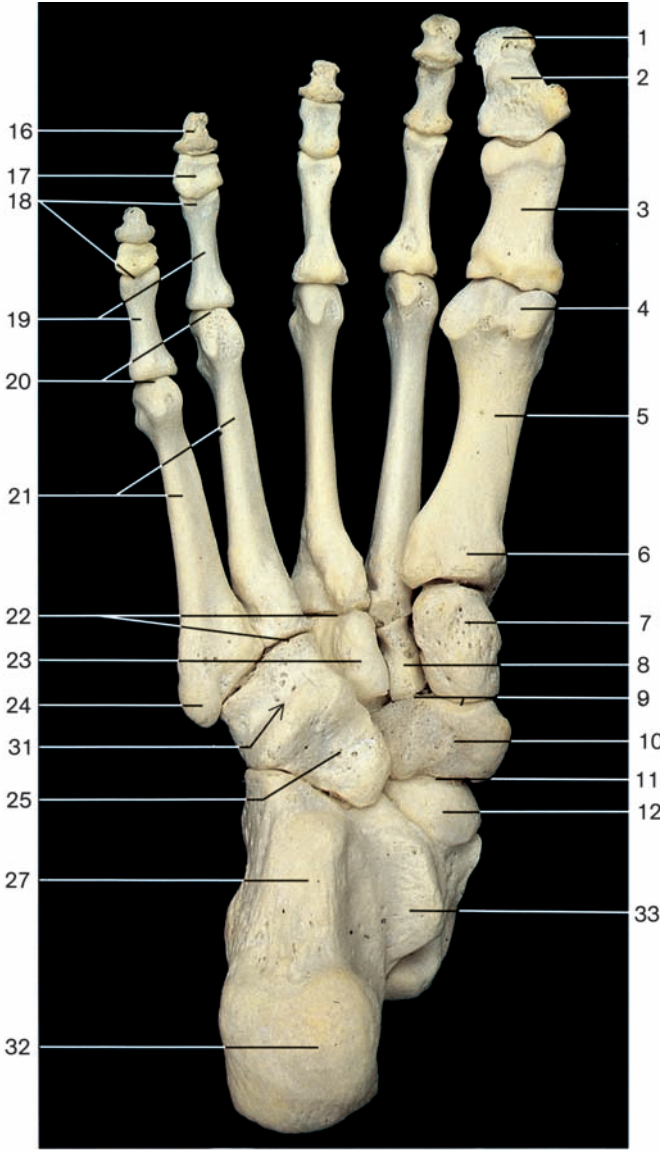
Right patella (posterior aspect).

- 1 Femur
- 2 Patellar surface of femur
- 3 Lateral epicondyle of femur
- 4 Intercondylar eminence of tibia
- 5 Lateral condyle of tibia
- 6 Position of tibiofibular joint
- 7 Head of fibula
- 8 Tuberosity of tibia
- 9 Fibula

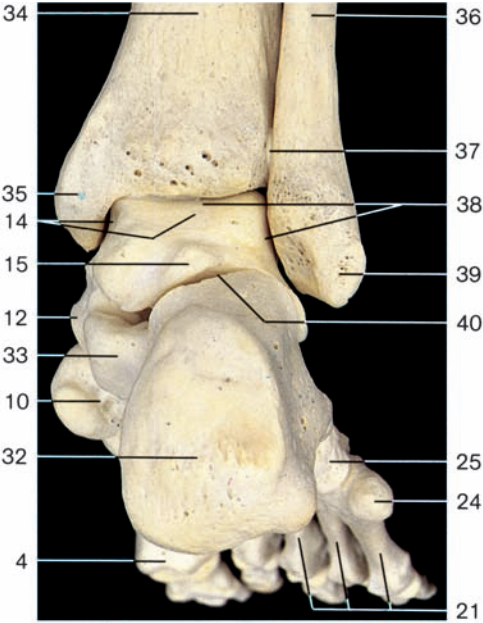
- 10 Shaft of tibia
- 11 Popliteal surface of femur
- 12 Intercondylar fossa of femur
- 13 Lateral condyle of femur
- 14 Patella
- 15 Base of patella
- 16 Anterior surface of patella
- 17 Apex of patella
- 18 Articular surface of patella



Bones of the right foot (dorsal aspect).

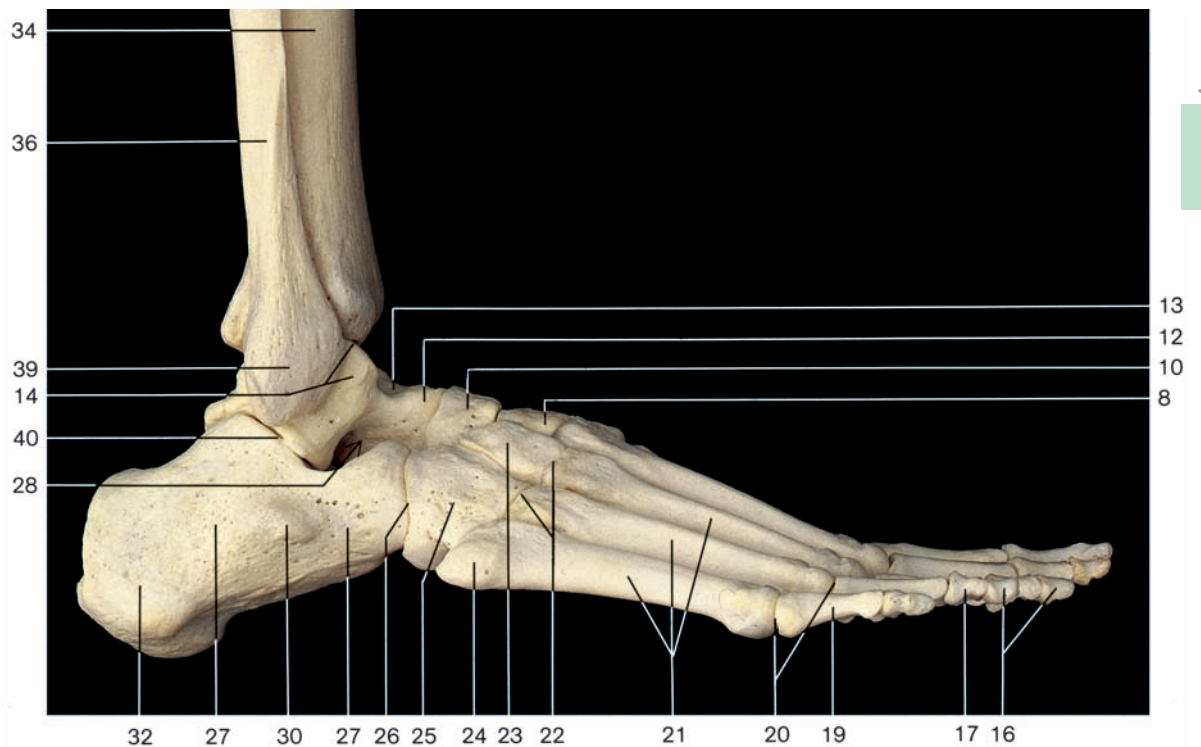


Bones of the right foot (plantar aspect).

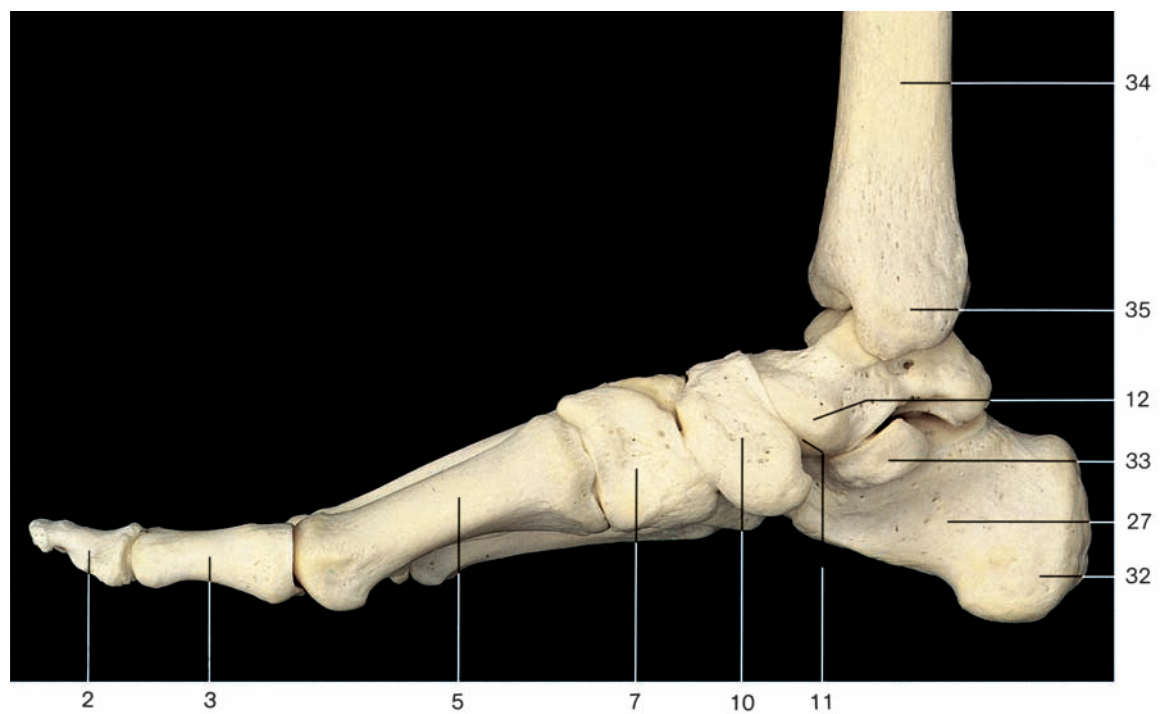


Bones of the right foot together with tibia and fibula (posterior aspect).

- 1 Tuberosity of distal phalanx of great toe
- 2 Distal phalanx of great toe
- 3 Proximal phalanx of great toe
- 4 Head of first metatarsal bone
- 5 First metatarsal bone
- 6 Base of first metatarsal bone
- 7 Medial cuneiform bone
- 8 Intermediate cuneiform bone
- 9 Position of cuneonavicular joint
- 10 Navicular bone

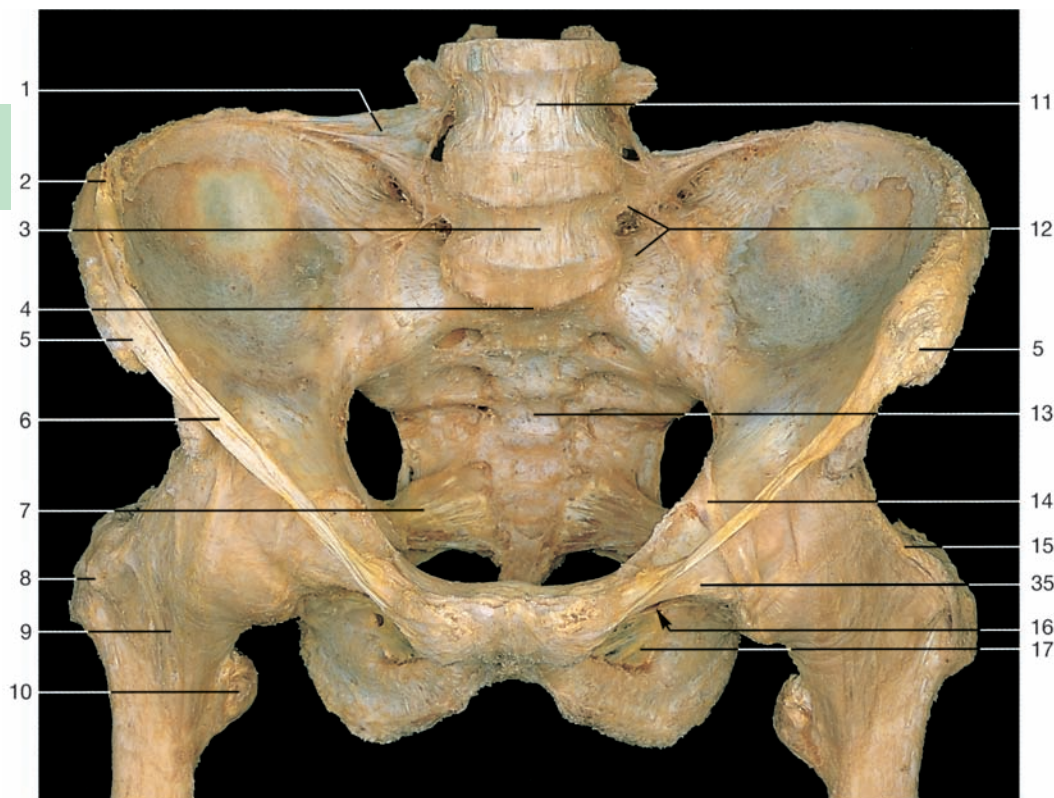


Bones of the right foot, tibia, and fibula (lateral aspect).



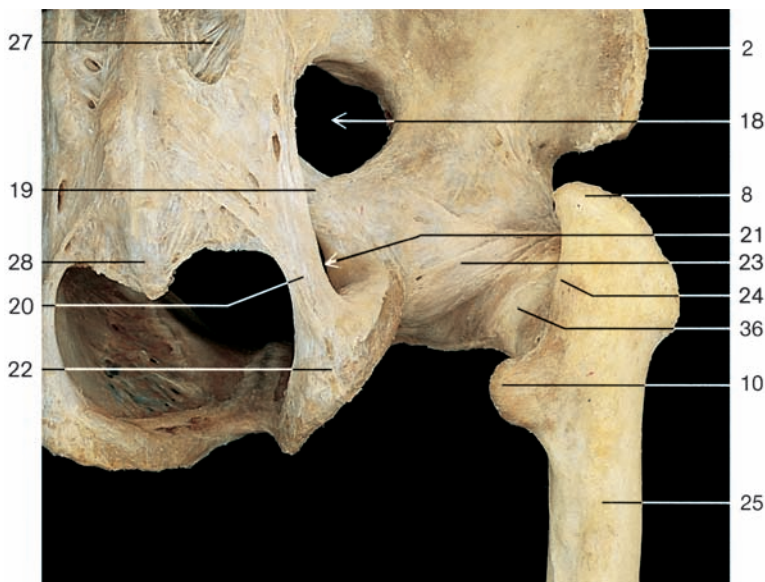
Bones of the right foot, tibia, and fibula (medial aspect).

- | | | |
|--|--|--|
| 11 Position of talocalcaneonavicular joint | 21 Metatarsal bones | 31 Groove for the tendon of peroneus longus muscle |
| 12 Head of talus | 22 Position of tarsometatarsal joints | 32 Calcaneal tuberosity |
| 13 Neck of talus | 23 Lateral cuneiform bone | 33 Sustentaculum tali |
| 14 Trochlea of talus | 24 Tuberosity of fifth metatarsal bone | 34 Tibia |
| 15 Posterior talar process | 25 Cuboid bone | 35 Medial malleolus |
| 16 Distal phalanges | 26 Position of calcaneocuboid joint | 36 Fibula |
| 17 Middle phalanx | 27 Calcaneus | 37 Position of tibiofibular syndesmosis |
| 18 Position of interphalangeal joints | 28 Tarsal sinus | 38 Position of ankle joint |
| 19 Proximal phalanges | 29 Lateral malleolar surface of talus | 39 Lateral malleolus |
| 20 Position of metatarsophalangeal joints | 30 Peroneal trochlea of calcaneus | 40 Position of subtalar joint |

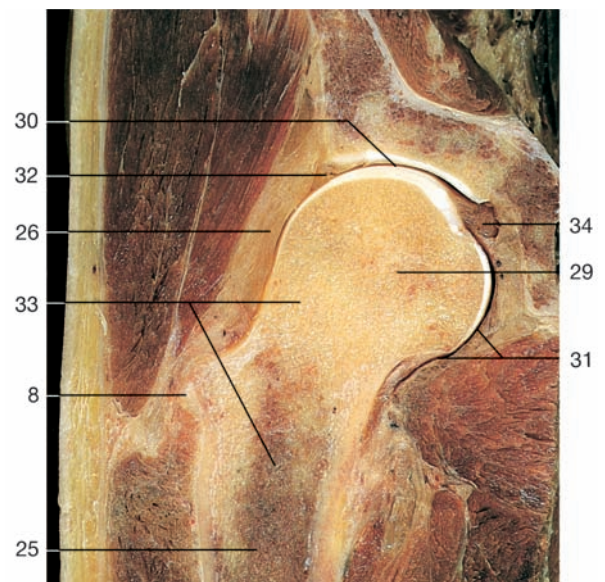


Ligaments of pelvis and hip joint (anterior aspect).

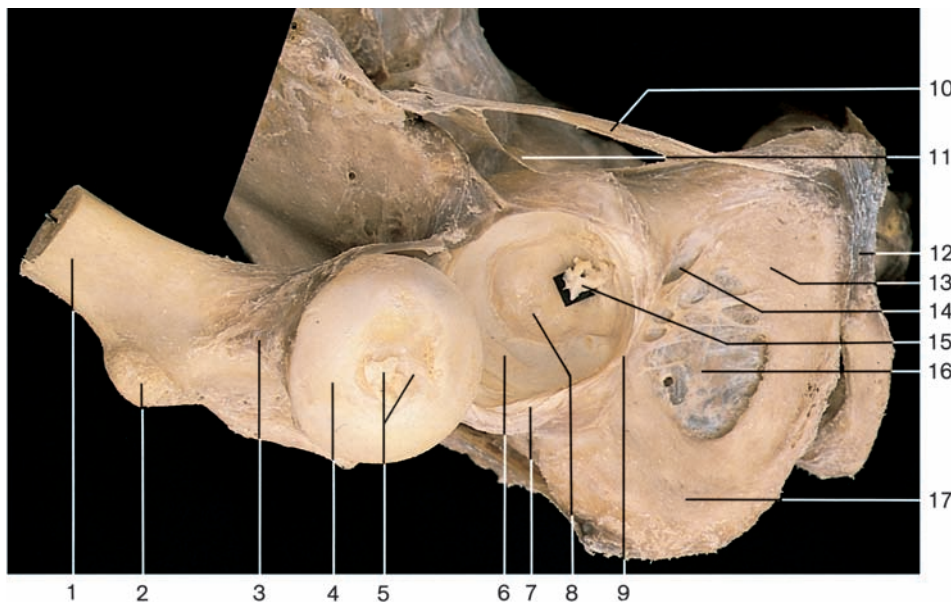
- | | | |
|---|---|---|
| 1 Iliolumbar ligament | 13 Sacrum | 26 Articular capsule of hip joint |
| 2 Iliac crest | 14 Iliopectineal arch | 27 Dorsal sacro-iliac ligaments |
| 3 Fifth lumbar vertebra | 15 Iliofemoral ligament (horizontal band) | 28 Coccyx |
| 4 Sacral promontory | 16 Obturator canal | 29 Head of femur |
| 5 Anterior superior iliac spine | 17 Obturator membrane | 30 Articular cartilage of head of femur |
| 6 Inguinal ligament | 18 Greater sciatic foramen | 31 Articular cavity of hip joint |
| 7 Sacrospinous ligament | 19 Sacrospinous ligament | 32 Acetabular lip |
| 8 Greater trochanter | 20 Sacrotuberous ligament | 33 Spongy bone |
| 9 Iliofemoral ligament (vertical band) | 21 Lesser sciatic foramen | 34 Ligament of head of femur |
| 10 Lesser trochanter | 22 Ischial tuberosity | 35 Pubofemoral ligament |
| 11 Fourth lumbar vertebra | 23 Ischiofemoral ligament | 36 Zona orbicularis |
| 12 Iliolumbar and ventral sacro-iliac ligaments | 24 Intertrochanteric crest | |
| | 25 Femur | |



Ligaments of pelvis and hip joint (right posterior aspect).



Coronal section through the right hip joint (anterior aspect).

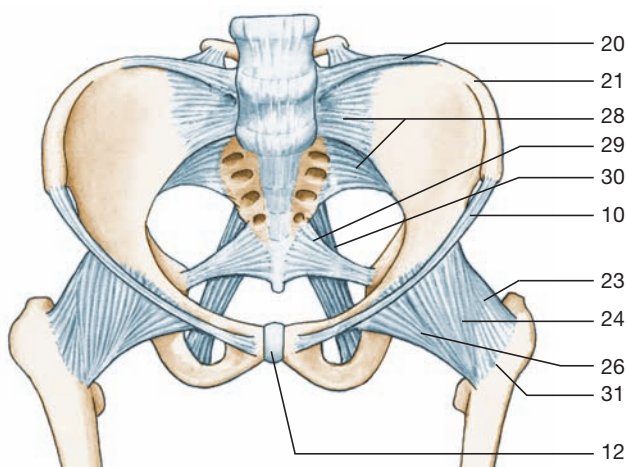


Right hip joint, opened (latero-anterior aspect). The ligament of the head of the femur has been divided, and the femur has been posteriorly reflected.

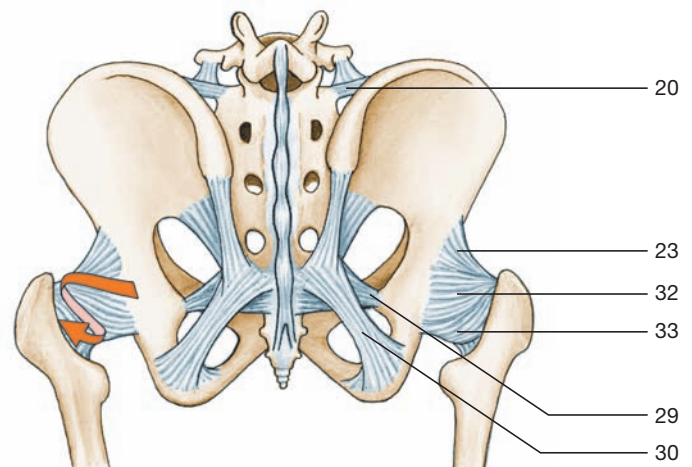


- 1 Femur
- 2 Lesser trochanter
- 3 Neck of femur
- 4 Head of femur
- 5 Fovea of head with cut edge of ligament of head
- 6 Lunate surface of acetabulum
- 7 Acetabular lip
- 8 Acetabular fossa
- 9 Transverse acetabular ligament
- 10 Inguinal ligament
- 11 Iliopectineal arch
- 12 Pubic symphysis
- 13 Pubis
- 14 Obturator canal
- 15 Ligament of head of femur
- 16 Obturator membrane
- 17 Ischium
- 18 Anterior longitudinal ligament (level of fifth lumbar vertebra)
- 19 Sacral promontory
- 20 Iliolumbar ligament
- 21 Iliac crest
- 22 Anterior superior iliac spine
- 23 Iliofemoral ligament (horizontal band)
- 24 Iliofemoral ligament (vertical band)
- 25 Greater trochanter
- 26 Pubofemoral ligament
- 27 Anterior inferior iliac spine
- 28 Ventral sacro-iliac ligaments
- 29 Sacrospinous ligament
- 30 Sacrotuberous ligament
- 31 Intertrochanteric line
- 32 Ischiofemoral ligament
- 33 Zona orbicularis

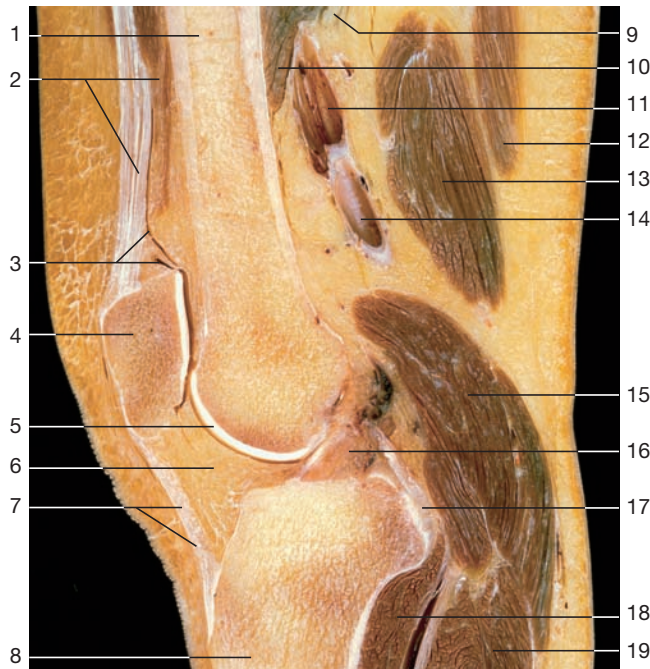
◁ **Ligaments of pelvis and hip joint (antero-lateral aspect).**



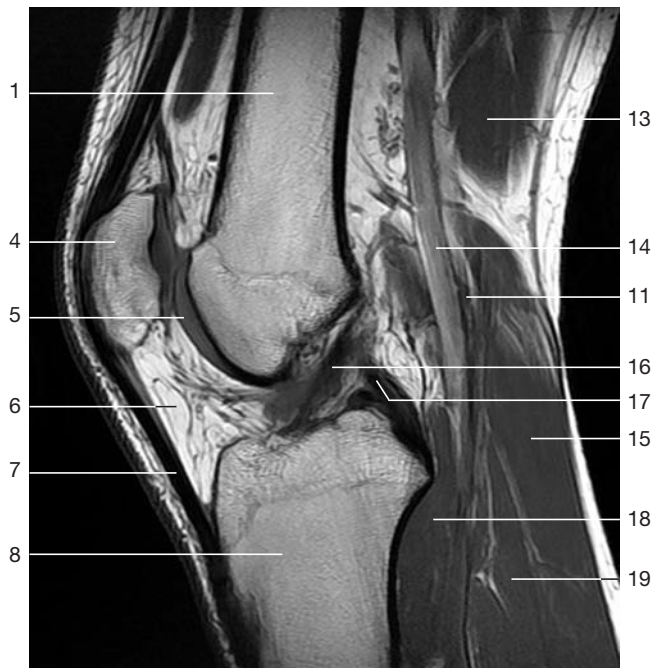
Ligaments of pelvis and hip joint (anterior aspect).



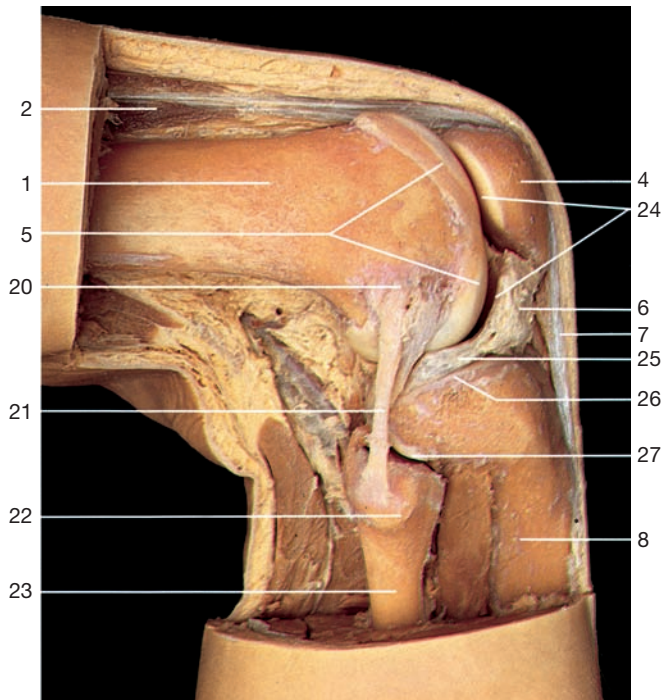
Ligaments of pelvis and hip joint (posterior aspect).



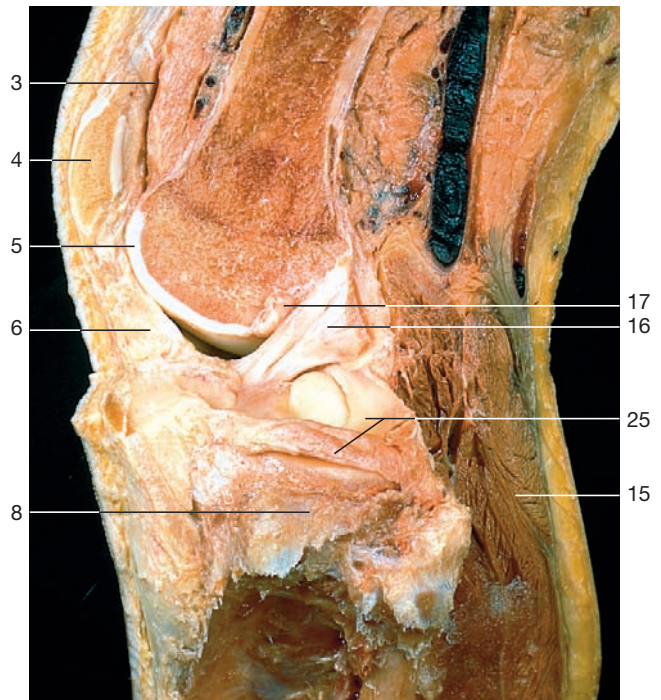
Sagittal section through the knee joint (lateral aspect).
Anterior surface to the left.



Sagittal section through the knee joint (MRI scan).
(From Heuck et al., MRT-Atlas, 2009.)



Right knee joint and tibiofibular joint with ligaments
(lateral aspect). Note the position of the lateral meniscus.

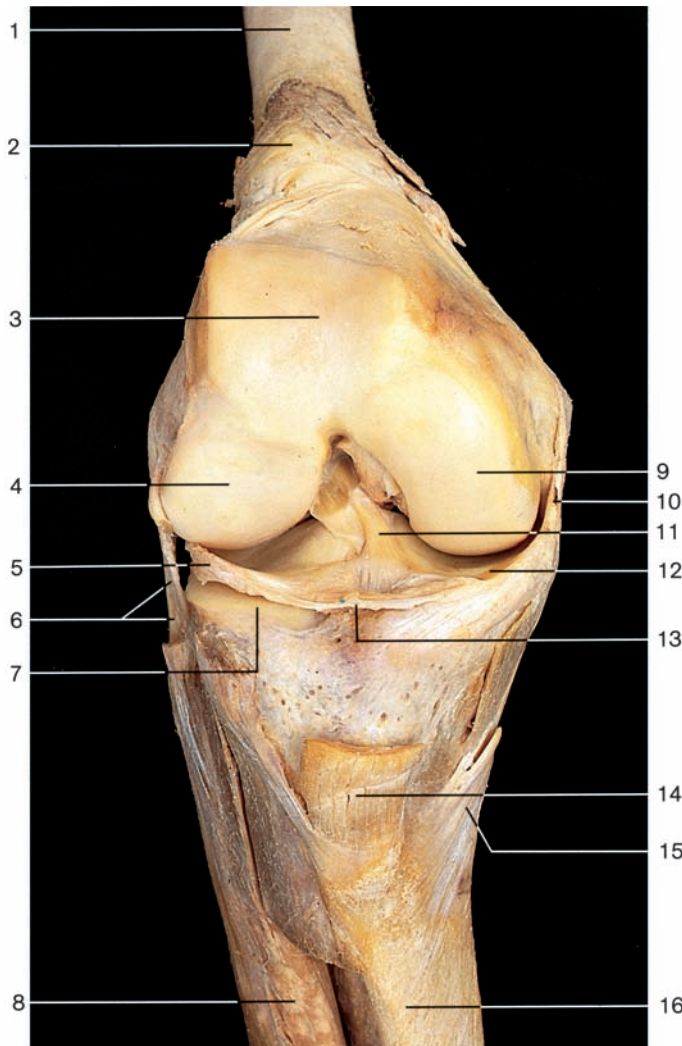


Left knee joint with anterior cruciate ligament (lateral aspect).

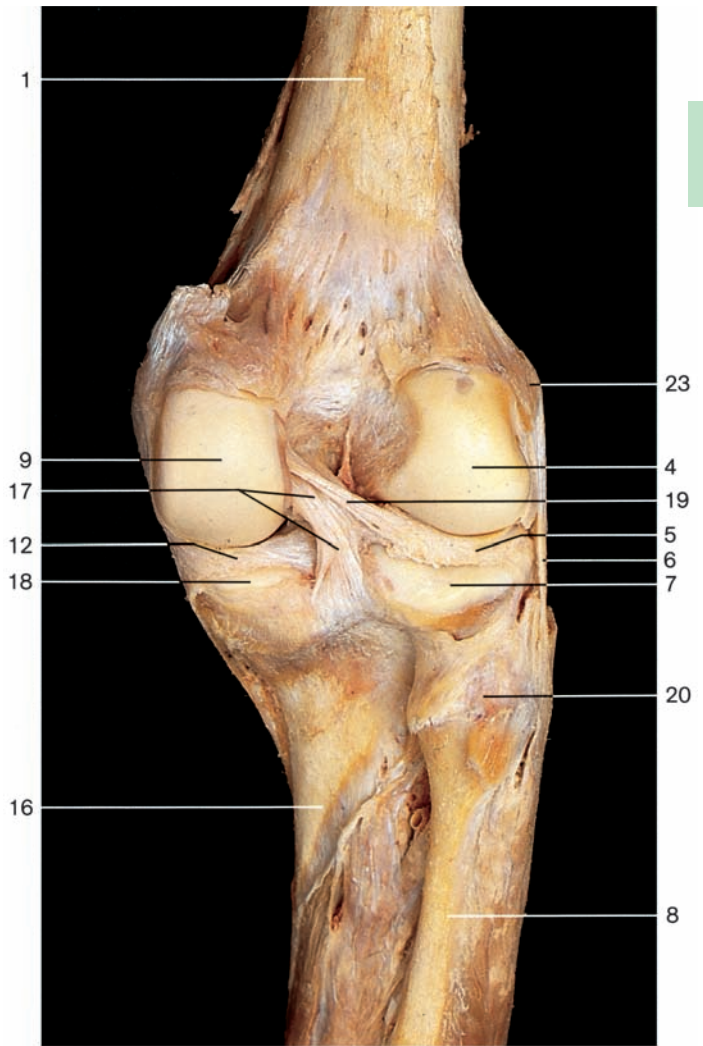
- 1 Femur
- 2 Quadriceps femoris muscle
- 3 Suprapatellar bursa and articular cavity
- 4 Patella
- 5 Articular cartilage of femur
- 6 Infrapatellar fat pad
- 7 Patellar ligament
- 8 Tibia
- 9 Tibial nerve

- 10 Adductor magnus muscle
- 11 Popliteal vein
- 12 Semitendinosus muscle
- 13 Semimembranosus muscle
- 14 Popliteal artery
- 15 Gastrocnemius muscle
- 16 Anterior cruciate ligament
- 17 Posterior cruciate ligament
- 18 Popliteus muscle

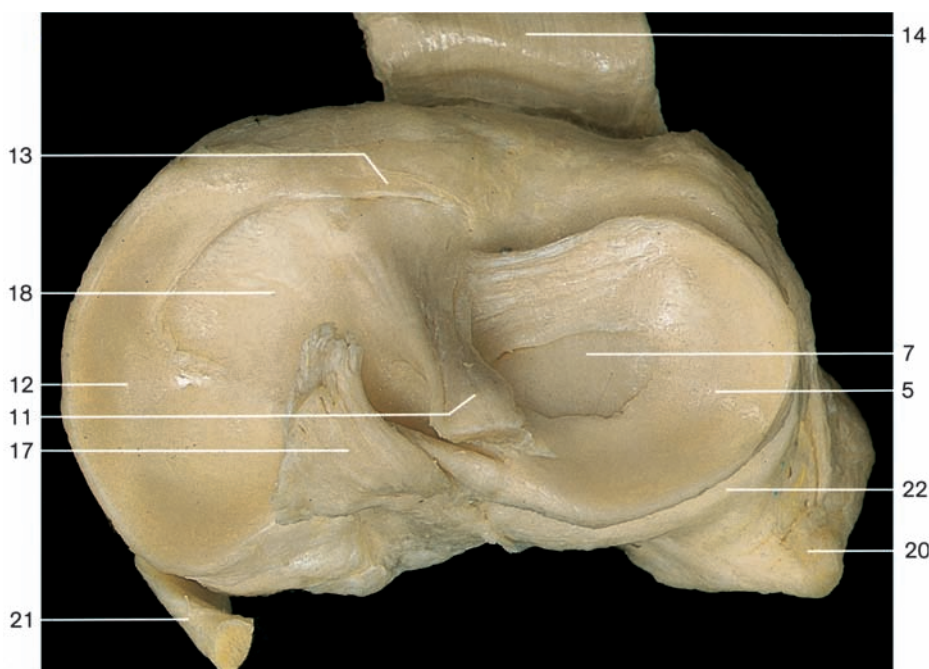
- 19 Soleus muscle
- 20 Lateral epicondyle of femur
- 21 Fibular collateral ligament
- 22 Head of fibula
- 23 Fibula
- 24 Articular cavity of knee joint
- 25 Lateral meniscus of knee joint
- 26 Lateral condyle of tibia
- 27 Tibiofibular joint



Right knee joint with ligaments (anterior aspect). The patella and articular capsule have been removed and the femur slightly flexed.

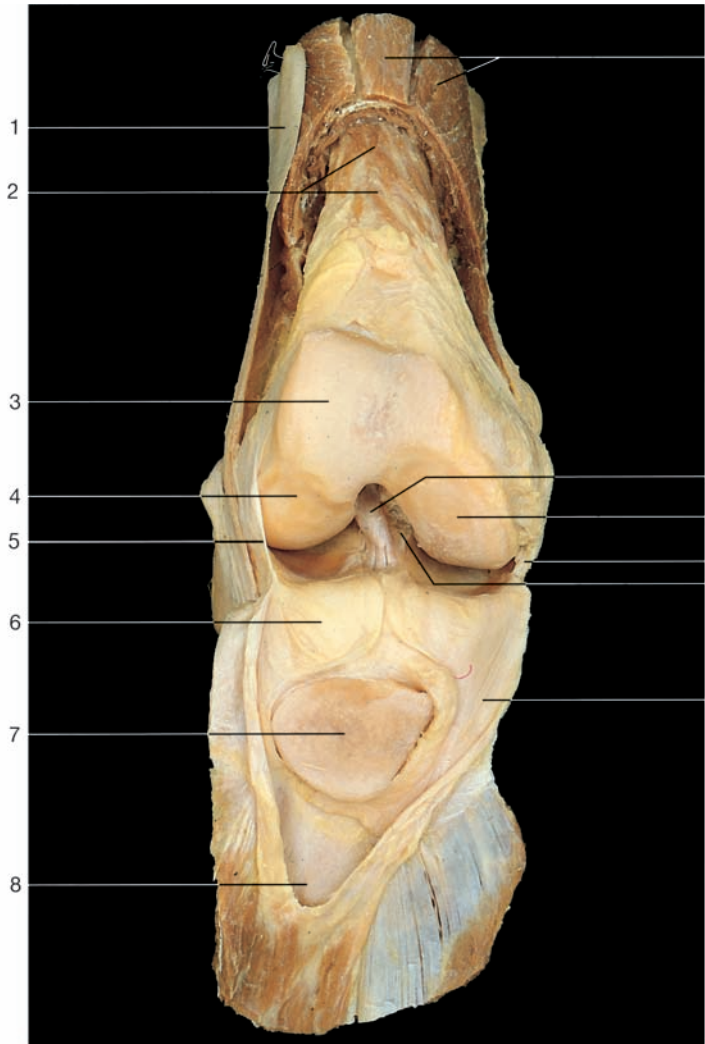


Right knee joint with ligaments (posterior aspect). The joint is extended and the articular capsule has been removed.



Articular surface of right tibia, menisci, and cruciate ligaments (superior aspect). Anterior margin of tibia above.

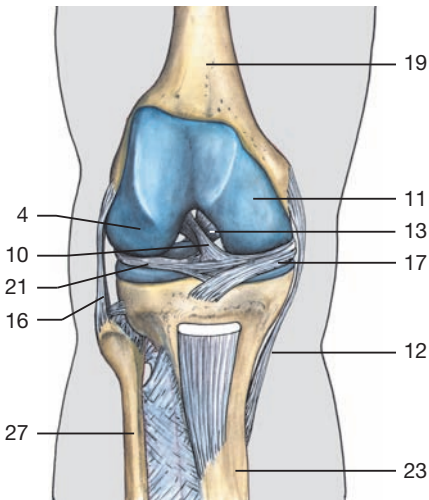
- 1 Femur
- 2 Articular capsule with suprapatellar bursa
- 3 Patellar surface
- 4 Lateral condyle of femur
- 5 Lateral meniscus of knee joint
- 6 Fibular collateral ligament
- 7 Lateral condyle of tibia (superior articular surface)
- 8 Fibula
- 9 Medial condyle of femur
- 10 Tibial collateral ligament
- 11 Anterior cruciate ligament
- 12 Medial meniscus of knee joint
- 13 Transverse ligament of knee
- 14 Patellar ligament
- 15 Common tendon of sartorius, semitendinosus, and gracilis muscles
- 16 Tibia
- 17 Posterior cruciate ligament
- 18 Medial condyle of tibia (superior articular surface)
- 19 Posterior meniscofemoral ligament
- 20 Head of fibula
- 21 Tendon of semimembranosus muscle
- 22 Posterior attachment of articular capsule of knee joint
- 23 Lateral epicondyle of femur



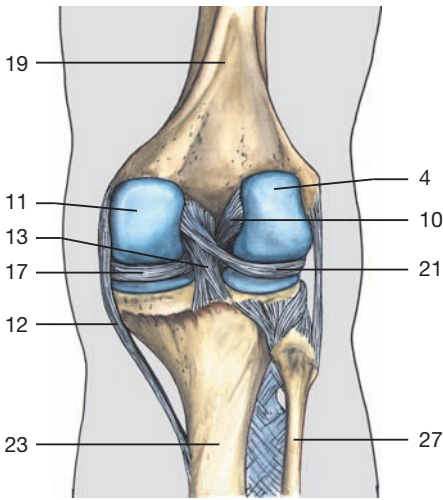
Right knee joint, opened (anterior aspect). The patellar ligament with the patella have been reflected.



Coronal section through the knee joint (MRI scan).
(From Heuck et al., MRT-Atlas, 2009.)



Ligaments of the right knee joint
(anterior aspect).



Ligaments of the right knee joint
(posterior aspect).

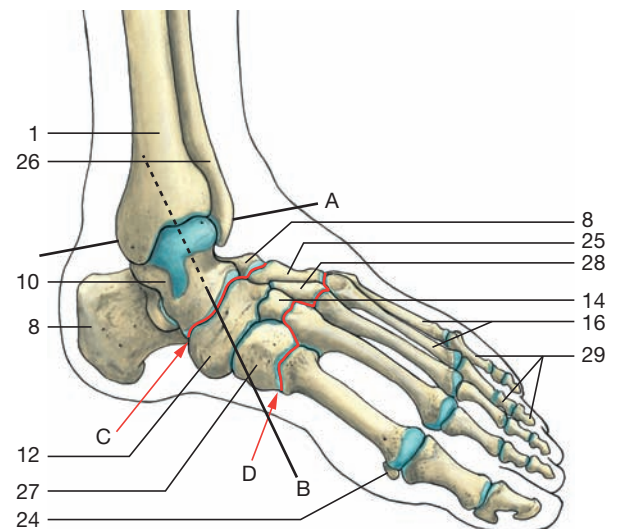
- 1 Iliotibial tract
- 2 Articular muscle of knee
- 3 Patellar surface
- 4 Lateral condyle of femur
- 5 Articular capsule
- 6 Infrapatellar fat pad
- 7 Patella (articular surface)
- 8 Suprapatellar bursa
- 9 Quadriceps femoris muscle
- 10 Anterior cruciate ligament
- 11 Medial condyle of femur
- 12 Tibial collateral ligament
- 13 Posterior cruciate ligament
- 14 Medial epicondyle of femur
- 15 Intercondylar fossa of femur
- 16 Fibular collateral ligament
- 17 Medial meniscus of knee joint
- 18 Medial intercondylar tubercle
- 19 Femur
- 20 Lateral epicondyle of femur
- 21 Lateral meniscus of knee joint
- 22 Epiphysial line of tibia
- 23 Tibia
- 24 Vastus medialis muscle
- 25 Vastus lateralis muscle
- 26 Great saphenous vein
- 27 Fibula



Sagittal section through the foot at the level of the first phalanx.



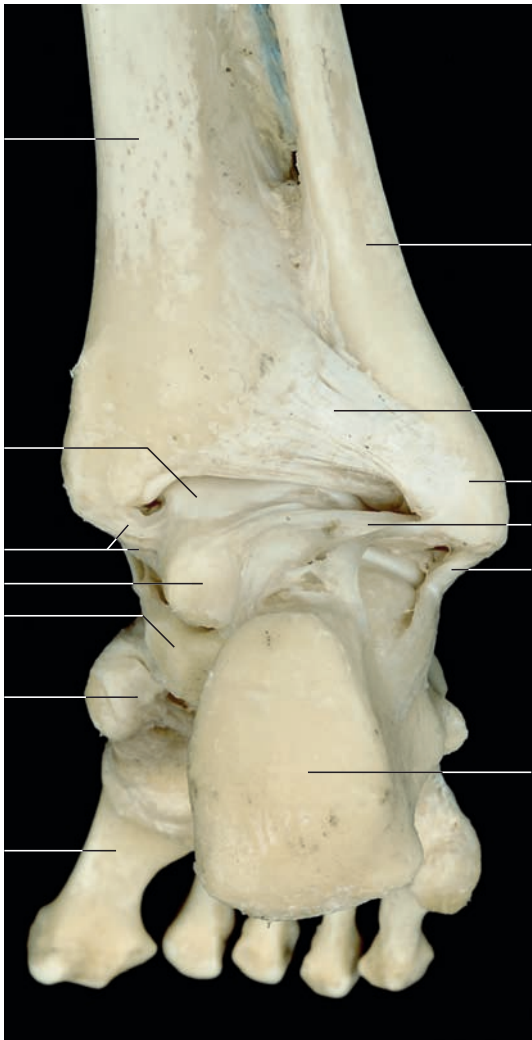
Sagittal section through the foot and leg (MRI scan).
(From Heuck et al., MRT-Atlas, 2009.)



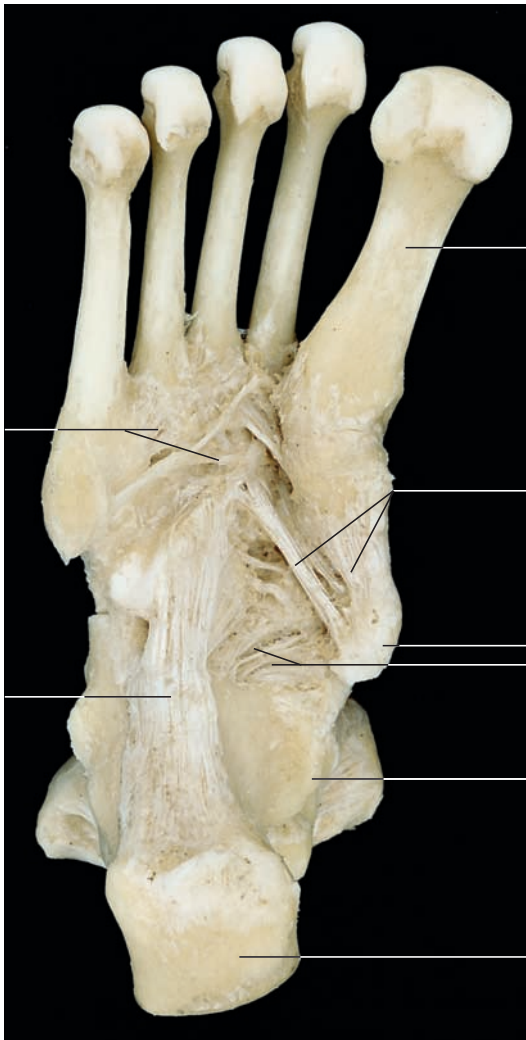
Skeleton of the left foot. Joints are indicated in blue.
Red lines = axis of joints.

- A = Talocrural joint
B = Talocalcaneonavicular joint
C = Transverse tarsal joint (Chopart joint line)
D = Tarsometatarsal joints (Lisfranc joint line)

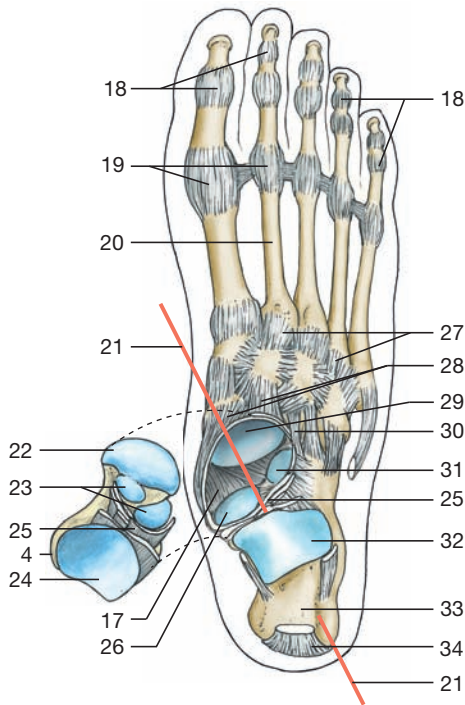
- | | | |
|--|---|----------------------------------|
| 1 Tibia | 16 Metatarsal bones | 23 Flexor hallucis brevis muscle |
| 2 Deep flexor muscles of leg | 17 Metatarsophalangeal and interphalangeal joints | 24 Sesamoid bone |
| 3 Superficial flexor muscles of leg | 18 Quadratus plantae muscle with flexor tendons | 25 Cuboid bone |
| 4 Ankle joint | 19 Flexor digitorum brevis muscle | 26 Fibula |
| 5 Interosseous talocalcaneal ligament | 20 Plantar aponeurosis | 27 Medial cuneiform bone |
| 6 Subtalar joint | 21 Tendon of tibialis posterior muscle | 28 Lateral cuneiform bone |
| 7 Calcaneal or Achilles tendon and bursa | 22 Tendon of flexor hallucis longus muscle | 29 Phalanges |
| 8 Calcaneus | | |
| 9 Vessels and nerves of foot | | |



Ligaments of the ankle joint of the right foot (dorsal aspect).

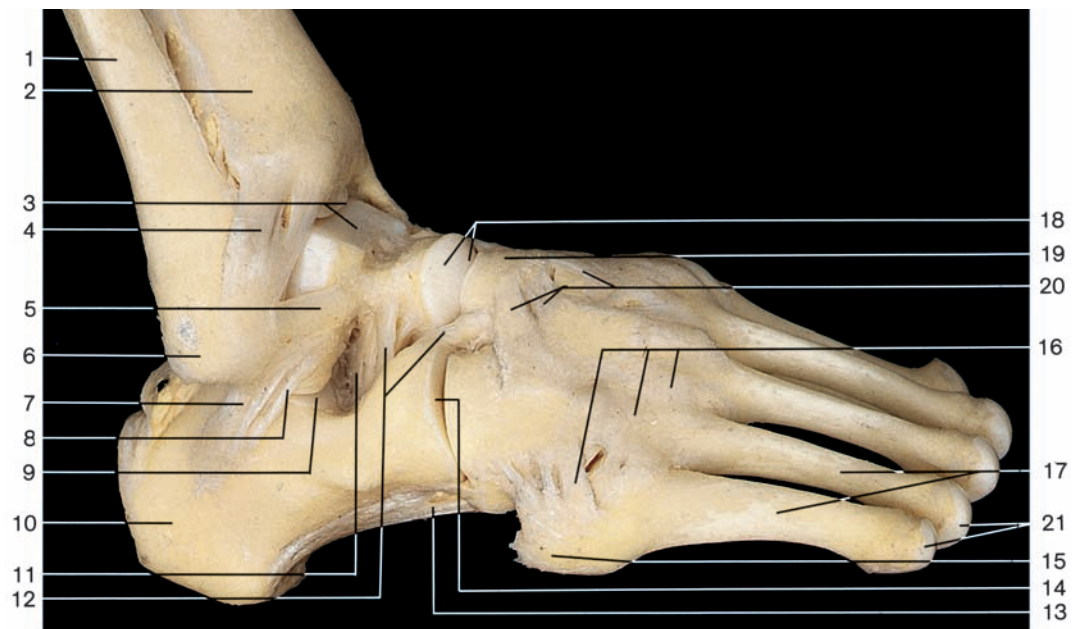


Deep ligaments of the right foot (plantar aspect). The toes have been removed.

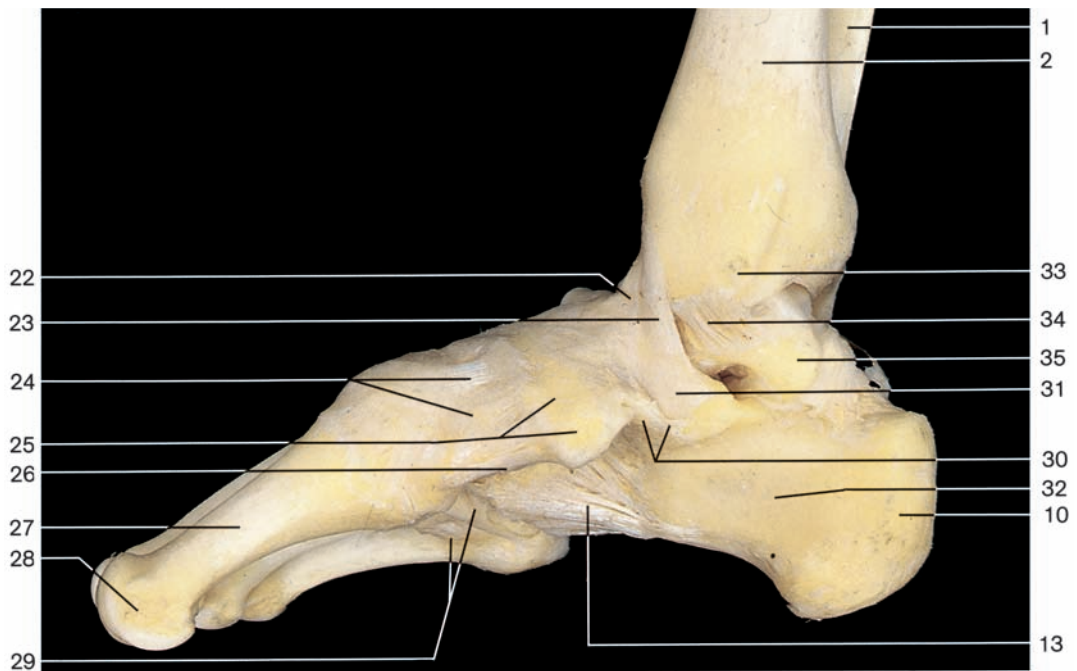


Ligaments of the foot. Top view of the talocalcaneonavicular joint. The talus has been rotated to show the articular surfaces of the joint.

- | | |
|---|--|
| 1 Tibia | 20 Second metatarsal bone |
| 2 Trochlea of talus | 21 Axis for inversion and eversion of foot |
| 3 Medial or deltoid ligament of ankle (posterior tibiotalar part) | 22 Navicular articular surface of talus |
| 4 Talus | 23 Anterior and middle calcaneal surfaces of talus |
| 5 Sustentaculum tali | 24 Posterior calcaneal surface of talus |
| 6 Navicular bone | 25 Talocalcaneal interosseous ligament |
| 7 First metatarsal bone | 26 Middle talar articular surface of calcaneus |
| 8 Fibula | 27 Dorsal tarsometatarsal ligaments |
| 9 Posterior tibiofibular ligament | 28 Talonavicular ligament |
| 10 Lateral malleolus | 29 Articular surface of navicular bone |
| 11 Posterior talofibular ligament | 30 Bifurcate ligament |
| 12 Calcaneofibular ligament | 31 Anterior talar articular surface of calcaneus |
| 13 Calcaneal tuberosity | 32 Posterior talar articular surface of calcaneus |
| 14 Plantar tarsometatarsal ligaments | 33 Calcaneus |
| 15 Long plantar ligament | 34 Calcaneal or Achilles tendon and bursa |
| 16 Plantar cuneonavicular ligaments | |
| 17 Plantar calcaneonavicular ligament | |
| 18 Articular capsules of interphalangeal joints | |
| 19 Articular capsules of metatarsophalangeal joints | |

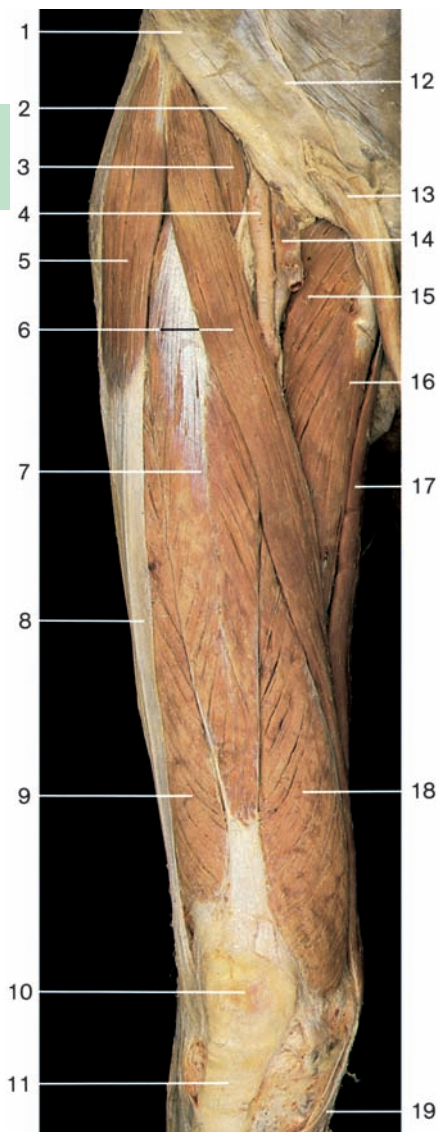


Ligaments of the right foot (lateral aspect).

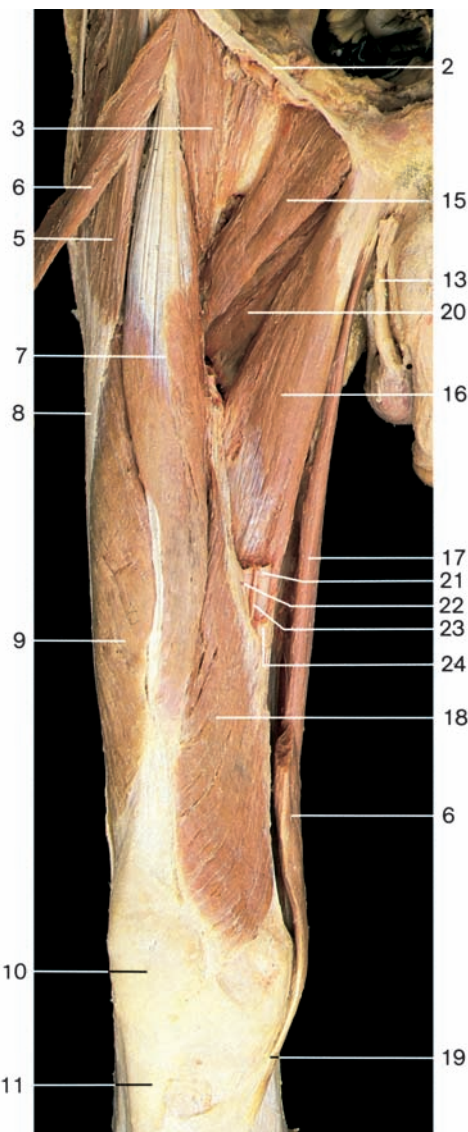


Ligaments of the right foot (medial aspect).

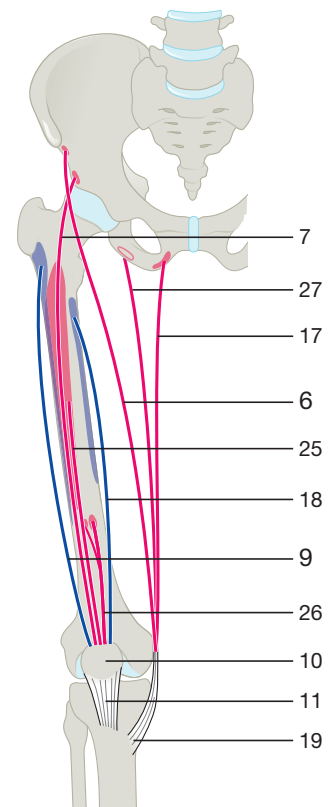
- | | |
|--|--|
| 1 Fibula | 19 Navicular bone |
| 2 Tibia | 20 Dorsal cuneonavicular ligaments |
| 3 Trochlea of talus and ankle joint | 21 Heads of metatarsal bones |
| 4 Anterior tibiofibular ligament | 22 Medial or deltoid ligament of ankle (tibionavicular part) |
| 5 Anterior talofibular ligament | 23 Medial or deltoid ligament of ankle (tibiocalcaneal part) |
| 6 Lateral malleolus | 24 Dorsal cuneonavicular ligaments |
| 7 Calcaneofibular ligament | 25 Navicular bone |
| 8 Lateral talocalcaneal ligament | 26 Plantar cuneonavicular ligament |
| 9 Subtalar joint | 27 First metatarsal bone |
| 10 Calcaneal tuberosity | 28 Head of first metatarsal bone |
| 11 Interosseous talocalcaneal ligament | 29 Plantar tarsometatarsal ligaments |
| 12 Bifurcate ligament | 30 Plantar calcaneonavicular ligament |
| 13 Long plantar ligament | 31 Sustentaculum tali |
| 14 Calcaneocuboid joint | 32 Calcaneus |
| 15 Tuberosity of fifth metatarsal bone | 33 Medial malleolus |
| 16 Dorsal tarsometatarsal ligaments | 34 Medial or deltoid ligament of ankle (posterior tibiotalar part) |
| 17 Metatarsal bones | 35 Talus |
| 18 Head of talus and talocalcaneonavicular joint | |



Extensor and adductor muscles of the thigh (right side, anterior aspect).



Quadriceps muscle and superficial layer of adductor muscles of the thigh (right side, anterior aspect). The sartorius muscle has been divided.

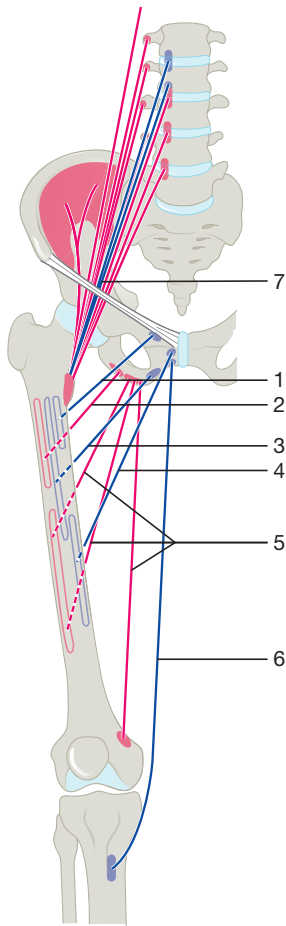


Course of the extensor muscles of the thigh and muscles inserting with common tendon on the tibia (anterior aspect).

- 1 Anterior superior iliac spine
- 2 Inguinal ligament
- 3 Iliopsoas muscle
- 4 Femoral artery
- 5 Tensor fasciae latae muscle
- 6 Sartorius muscle
- 7 Rectus femoris muscle
- 8 Iliotibial tract
- 9 Vastus lateralis muscle
- 10 Patella
- 11 Patellar ligament

- 12 Aponeurosis of external abdominal oblique muscle
- 13 Spermatic cord
- 14 Femoral vein
- 15 Pectineus muscle
- 16 Adductor longus muscle
- 17 Gracilis muscle
- 18 Vastus medialis muscle
- 19 Common tendon of sartorius, gracilis, and semitendinosus muscles (pes anserinus)

- 20 Adductor brevis muscle
- 21 Femoral artery
- 22 Femoral vein
- 23 Saphenous nerve
- 24 Vasto-adductor membrane
- 25 Vastus intermedius muscle
- 26 Articularis genus muscle
- 27 Semitendinosus muscle



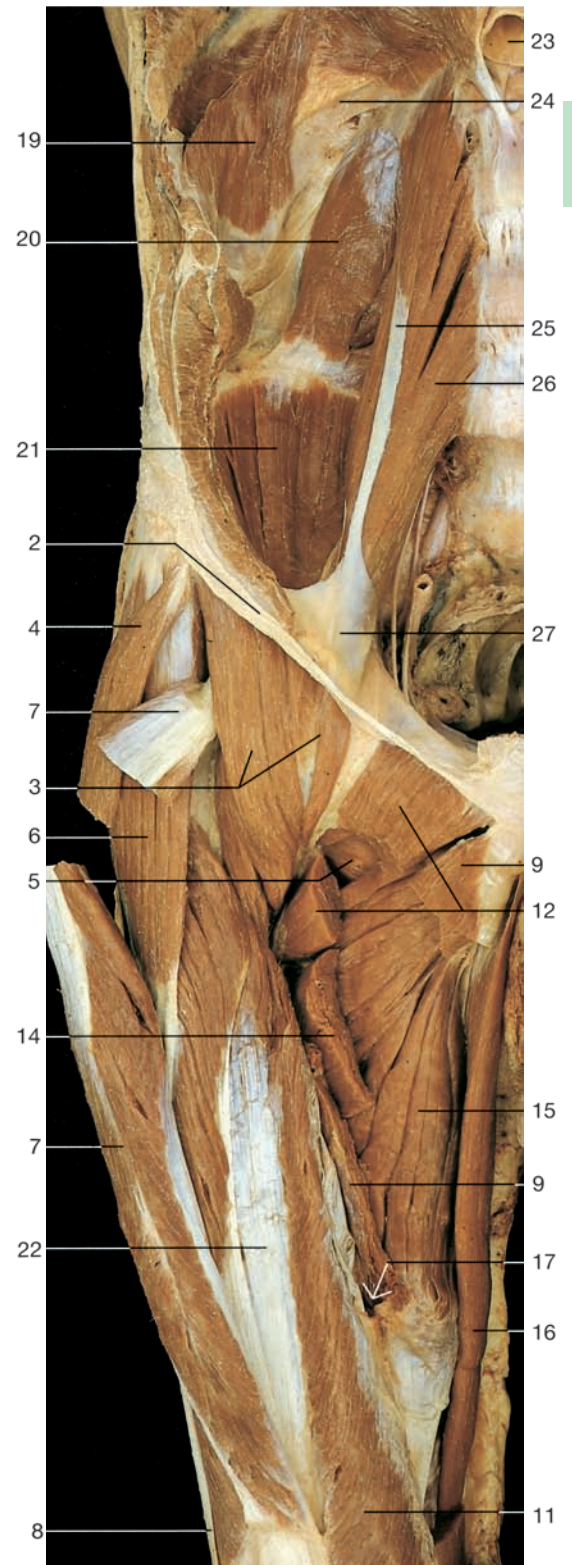
Course of the adductor muscles of the thigh (anterior aspect).

- 1 Pectineus muscle (blue)
- 2 Adductor minimus muscle (red)
- 3 Adductor brevis muscle (blue)
- 4 Adductor longus muscle (blue)
- 5 Adductor magnus and minimus muscles (red)
- 6 Gracilis muscle (blue)
- 7 Iliopsoas muscle (blue and red)



Adductor magnus muscle and deep layer of adductor muscles of the thigh (right side, anterior aspect). Pectineus, adductor longus, and brevis muscles have been divided.

- 1 Anterior superior iliac spine
- 2 Inguinal ligament
- 3 Iliopsoas muscle
- 4 Sartorius muscle
- 5 Obturator externus muscle
- 6 Tensor fasciae latae muscle
- 7 Rectus femoris muscle
- 8 Iliotibial tract
- 9 Adductor longus muscle (divided)
- 10 Vastus lateralis muscle
- 11 Vastus medialis muscle
- 12 Pectineus muscle (divided)
- 13 Adductor minimus muscle
- 14 Adductor brevis muscle (cut)
- 15 Adductor magnus muscle
- 16 Gracilis muscle
- 17 Adductor canal
- 18 Vasto-adductor membrane
- 19 Diaphragm
- 20 Quadratus lumborum muscle
- 21 Iliacus muscle
- 22 Vastus intermedius muscle



Iliopsoas muscle and deepest layer of adductor muscles of the thigh (right side, anterior aspect). Pectineus, adductor longus and brevis, and rectus femoris muscles have been divided.

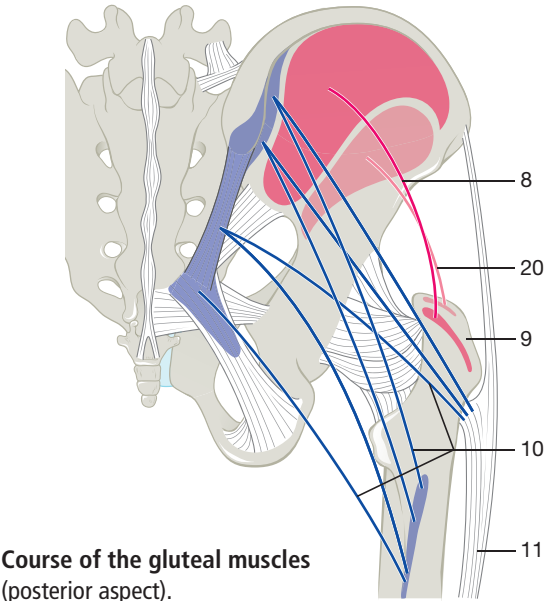
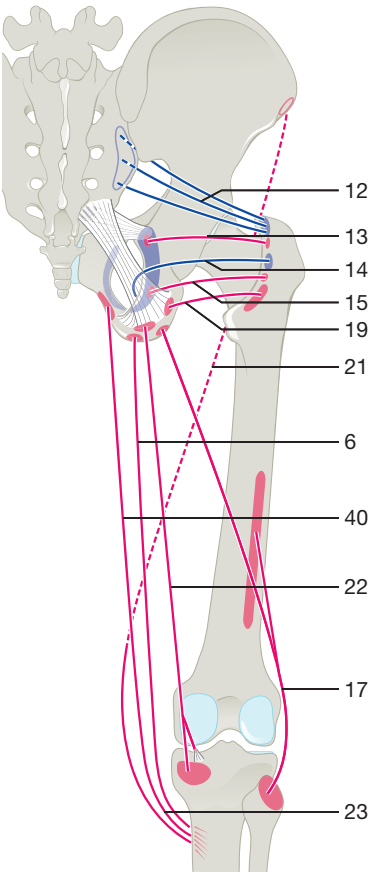
- 23 Aortic hiatus
- 24 Twelfth rib
- 25 Psoas minor muscle
- 26 Psoas major muscle
- 27 Iliopectineal arch



Gluteal muscles, superficial layer (right side, posterior aspect).

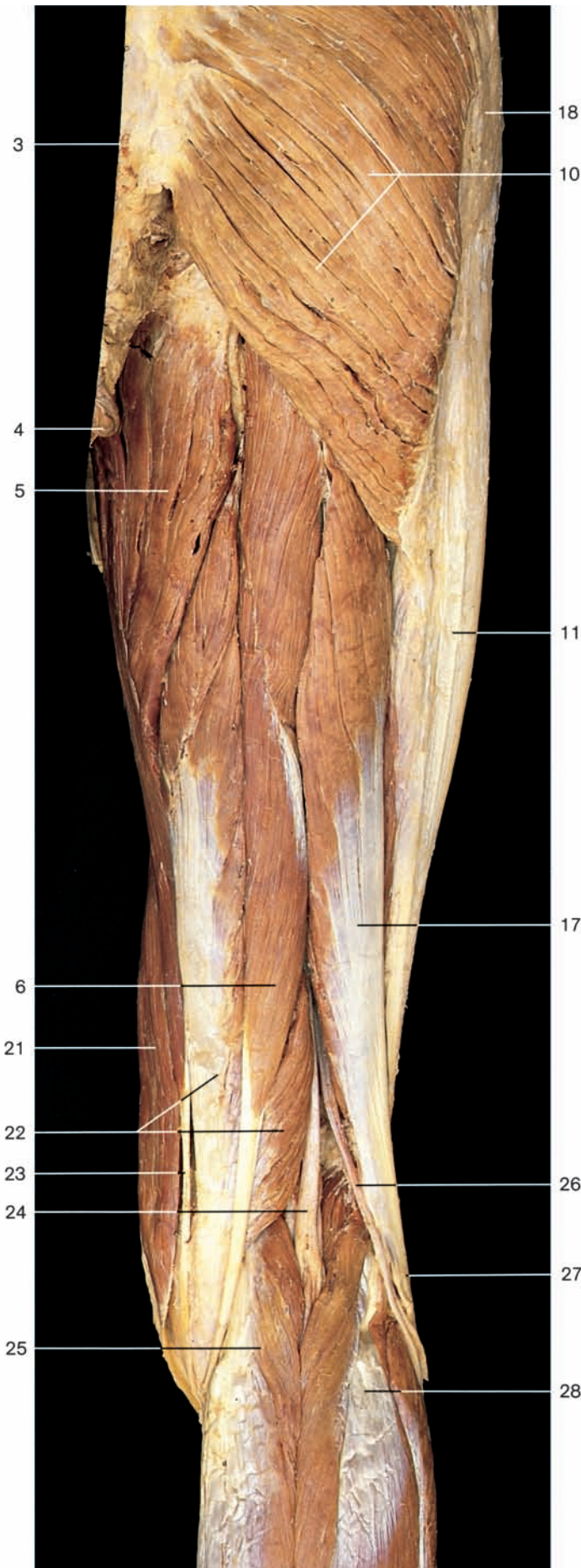


Gluteal muscles, deeper layer (right side, posterior aspect).



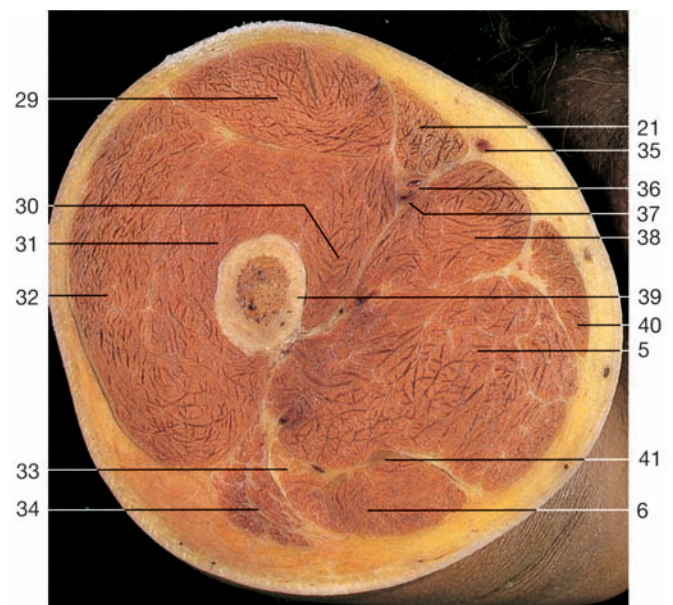
Course of the gluteal muscles (posterior aspect).

◁
Course of gluteal (deeper layer) and ischiocrural muscles (posterior aspect). The sartorius muscle is indicated by a dotted line.

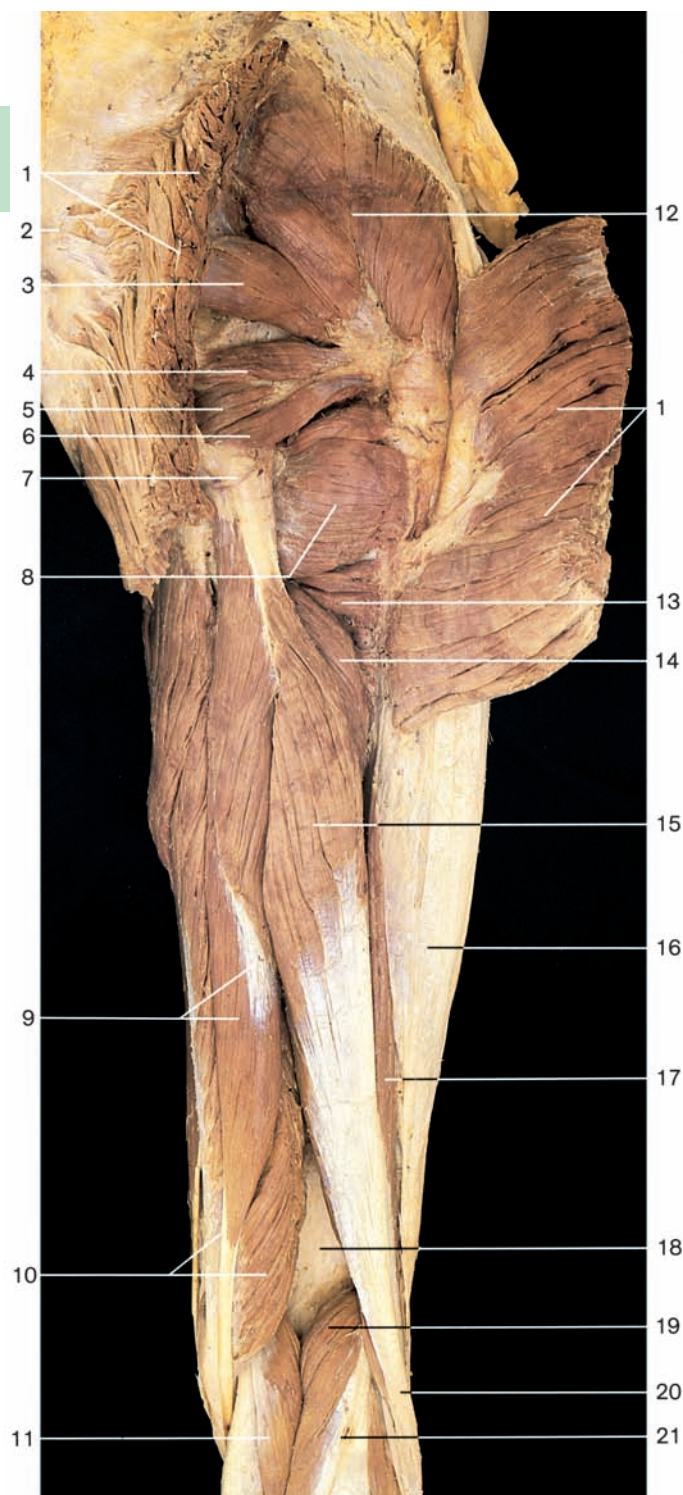


Flexor muscles of the thigh, superficial layer (right side, posterior aspect).

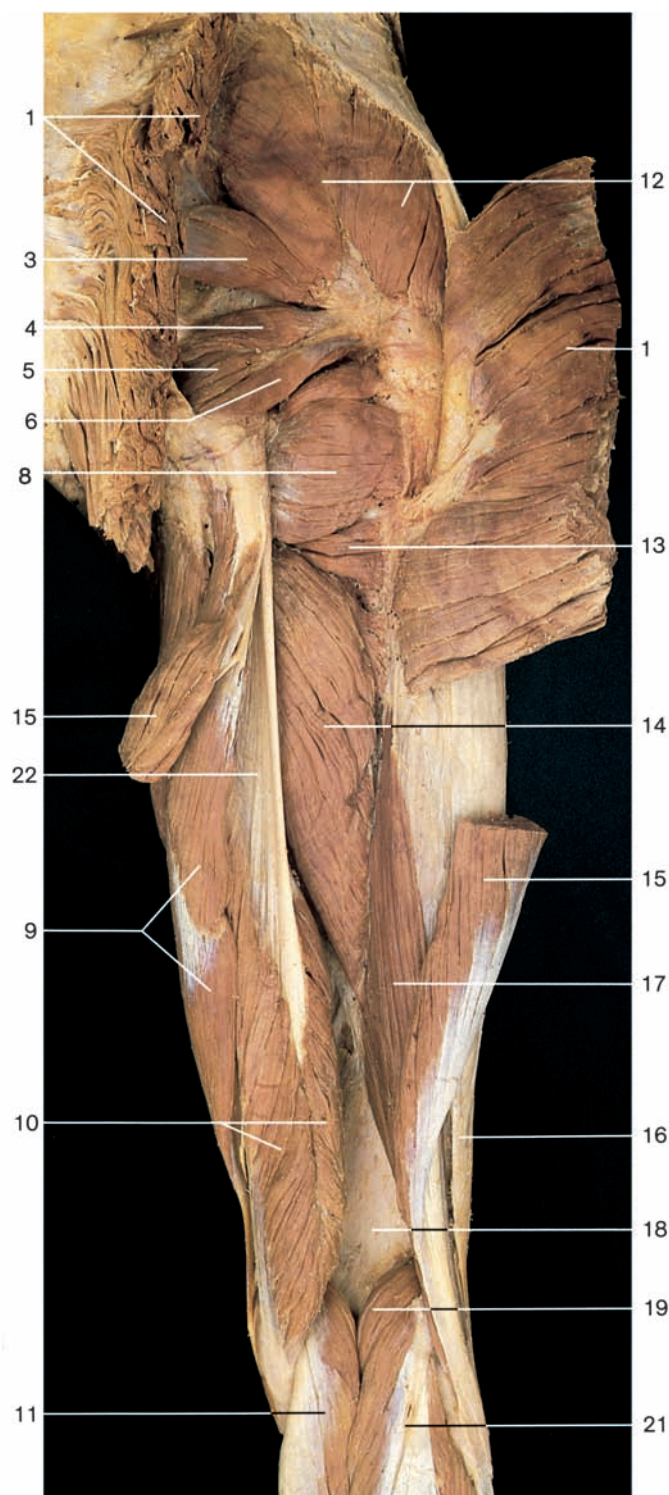
- 1 Thoracolumbar fascia
- 2 Spinous processes of lumbar vertebrae
- 3 Coccyx
- 4 Anus
- 5 Adductor magnus muscle
- 6 Semitendinosus muscle
- 7 Iliac crest
- 8 Gluteus medius muscle
- 9 Greater trochanter
- 10 Gluteus maximus muscle
- 11 Iliotibial tract
- 12 Piriformis muscle
- 13 Superior gemellus muscle
- 14 Obturator internus muscle
- 15 Inferior gemellus muscle
- 16 Ischial tuberosity
- 17 Biceps femoris muscle
- 18 Tensor fasciae latae muscle
- 19 Quadratus femoris muscle
- 20 Gluteus minimus muscle
- 21 Sartorius muscle
- 22 Semimembranosus muscle
- 23 Tendon of gracilis muscle
- 24 Tibial nerve
- 25 Medial head of gastrocnemius muscle
- 26 Common fibular nerve
- 27 Tendon of biceps femoris muscle
- 28 Lateral head of gastrocnemius muscle
- 29 Rectus femoris muscle
- 30 Vastus medialis muscle
- 31 Vastus intermedius muscle
- 32 Vastus lateralis muscle
- 33 Sciatic nerve
- 34 Gluteus maximus muscle (insertion)
- 35 Great saphenous vein
- 36 Femoral artery
- 37 Femoral vein
- 38 Adductor longus muscle
- 39 Femur
- 40 Gracilis muscle
- 41 Septum between semitendinosus and semimembranosus muscles



Cross section through the right thigh (inferior aspect). Anterior side on top.



Flexor muscles of the thigh (right side, posterior aspect).
The gluteus maximus muscle has been cut and reflected.

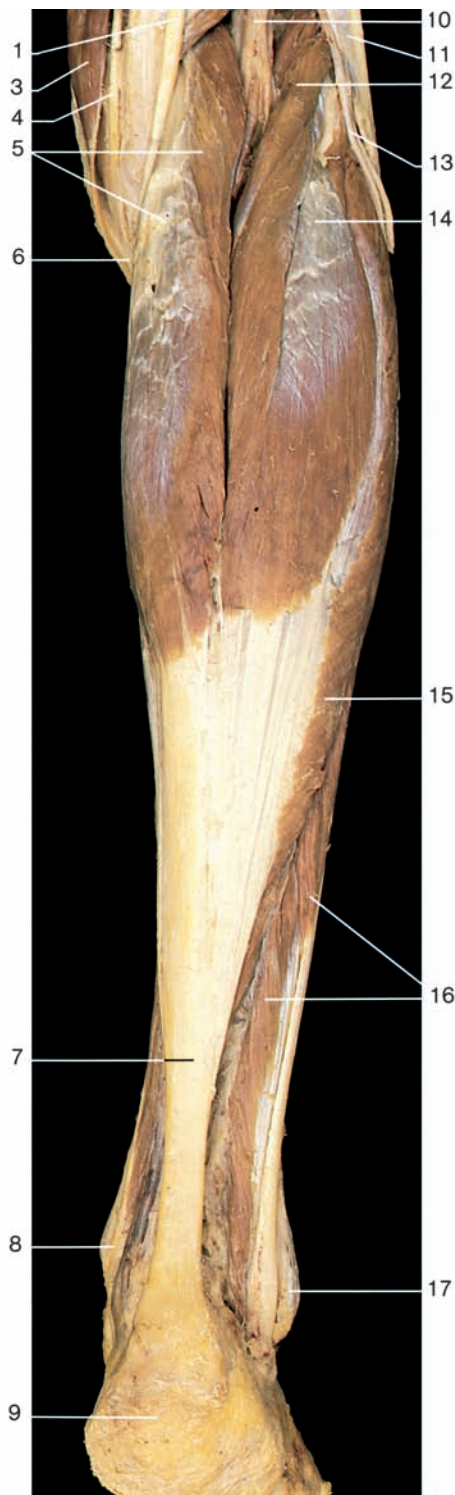


Flexor muscles of the thigh (right side, posterior aspect).
The gluteus maximus muscle and the long head of biceps femoris muscle have been divided and displaced.

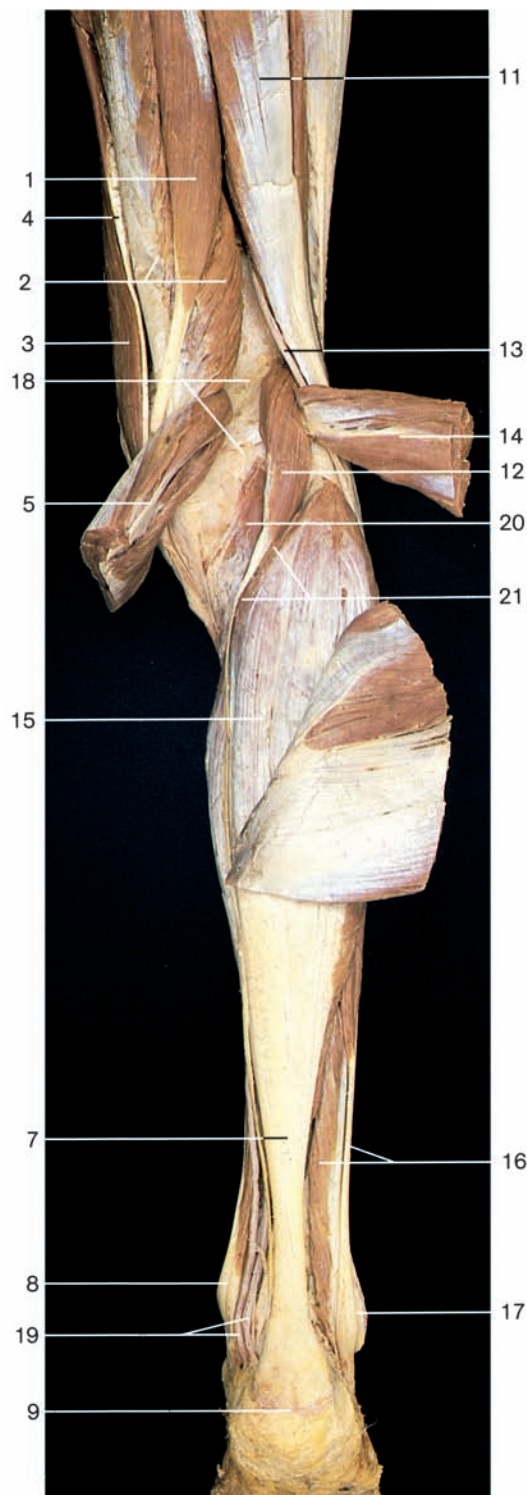
- 1 Gluteus maximus muscle (divided)
- 2 Position of coccyx
- 3 Piriformis muscle
- 4 Superior gemellus muscle
- 5 Obturator internus muscle
- 6 Inferior gemellus muscle
- 7 Ischial tuberosity
- 8 Quadratus femoris muscle

- 9 Semitendinosus muscle with intermediate tendon
- 10 Semimembranosus muscle
- 11 Medial head of gastrocnemius muscle
- 12 Gluteus medius muscle
- 13 Adductor minimus muscle
- 14 Adductor magnus muscle
- 15 Long head of biceps femoris muscle
- 16 Iliotibial tract

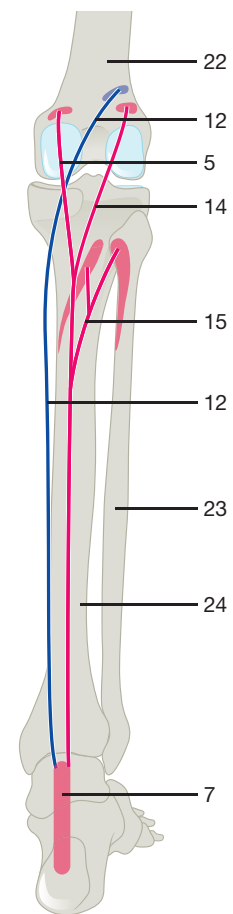
- 17 Short head of biceps femoris muscle
- 18 Popliteal surface of femur
- 19 Plantaris muscle
- 20 Tendon of biceps femoris muscle
- 21 Lateral head of gastrocnemius muscle
- 22 Tendon of semimembranosus muscle



Flexor muscles of the leg (right side, posterior aspect).



Flexor muscles of the leg (right side, posterior aspect). Both heads of the gastrocnemius muscle have been cut and reflected.



Course of the flexor muscles of the leg (posterior aspect).

- 1 Semitendinosus muscle
- 2 Semimembranosus muscle
- 3 Sartorius muscle
- 4 Tendon of gracilis muscle
- 5 Medial head of gastrocnemius muscle
- 6 Common tendon of gracilis, sartorius, and semitendinosus muscles (pes anserinus)
- 7 Calcaneal or Achilles tendon
- 8 Medial malleolus

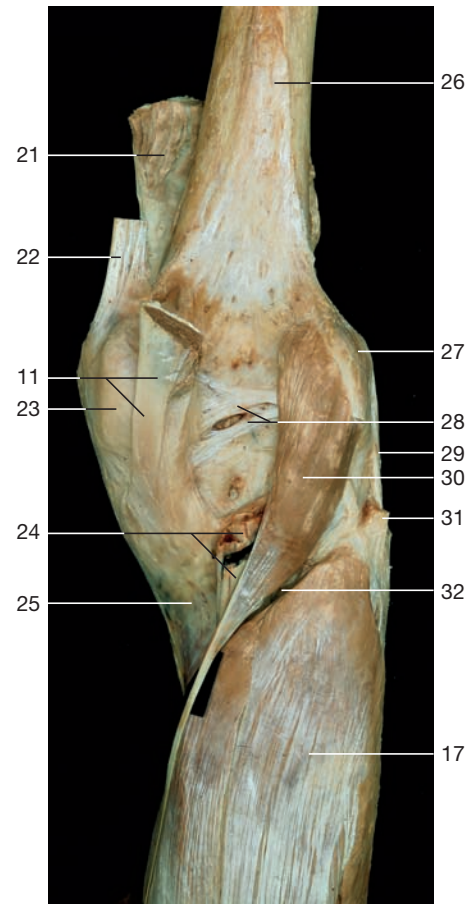
- 9 Calcaneal tuberosity
- 10 Tibial nerve
- 11 Biceps femoris muscle
- 12 Plantaris muscle
- 13 Common fibular nerve
- 14 Lateral head of gastrocnemius muscle
- 15 Soleus muscle
- 16 Peroneus longus and brevis muscles
- 17 Lateral malleolus

- 18 Popliteal fossa
- 19 Tibial nerve and posterior tibial artery
- 20 Popliteus muscle
- 21 Tendinous arch of soleus muscle
- 22 Femur
- 23 Fibula
- 24 Tibia



Muscles of leg and foot (right side, medial aspect).

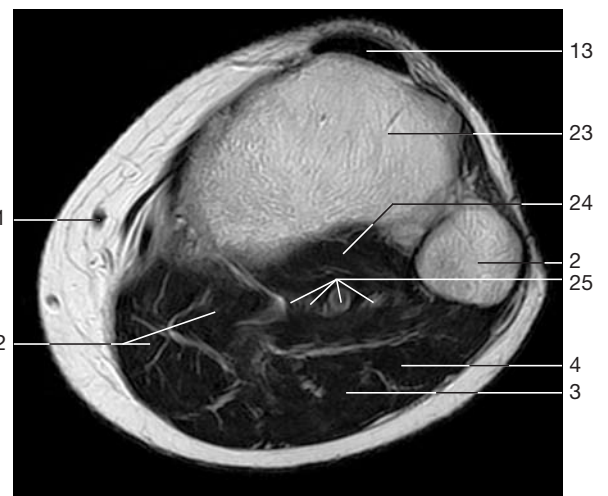
- | | | |
|---|---|--|
| 1 Vastus medialis muscle | 11 Tendon of semimembranosus muscle | 23 Medial condyle of femur |
| 2 Patella | 12 Sartorius muscle | 24 Popliteal artery and vein, and tibial nerve |
| 3 Patellar ligament | 13 Tendon of gracilis muscle | 25 Tibia |
| 4 Tibial tuberosity | 14 Tendon of semitendinosus muscle | 26 Femur |
| 5 Tibia | 15 Common tendon of gracilis, semitendinosus, and sartorius muscles (pes anserinus) | 27 Lateral epicondyle of femur |
| 6 Tendons of deep flexor muscles (from anterior to posterior: 1. tibialis posterior; 2. flexor digitorum longus; 3. flexor hallucis longus muscles) | 16 Medial head of gastrocnemius muscle | 28 Oblique popliteal ligament |
| 7 Flexor retinaculum | 17 Soleus muscle | 29 Lateral (fibular) collateral ligament |
| 8 Tendon of tibialis anterior muscle | 18 Calcaneal or Achilles tendon | 30 Plantaris muscle |
| 9 Tendon of extensor hallucis longus muscle | 19 Calcaneus muscle | 31 Tendon of biceps femoris muscle (divided) |
| 10 Abductor hallucis muscle | 20 Tendon of flexor hallucis longus muscle | 32 Tendinous arch of soleus muscle |
| | 21 Quadriceps femoris muscle (divided) | |
| | 22 Tendon of adductor magnus muscle (divided) | |



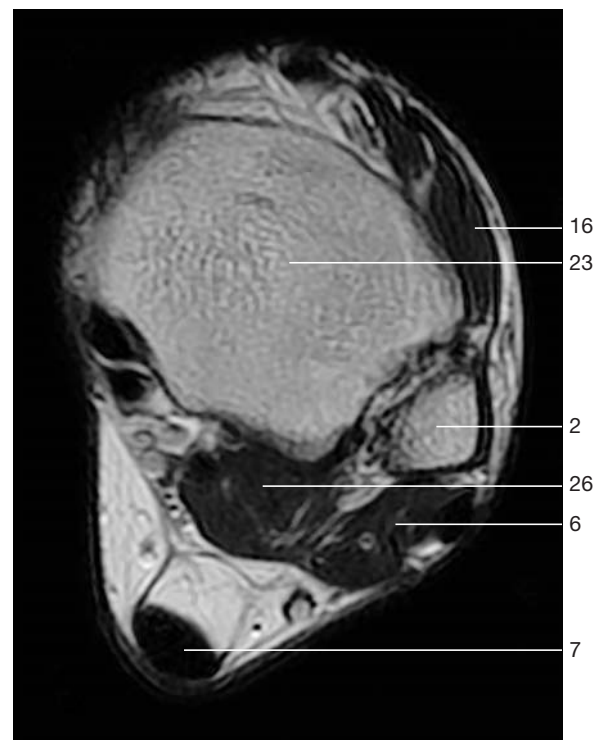
Popliteal region with plantaris and soleus muscles (right side, posterior aspect). Notice the insertion of the tendon of semimembranosus muscle.



Muscles of leg and foot (right side, lateral aspect).

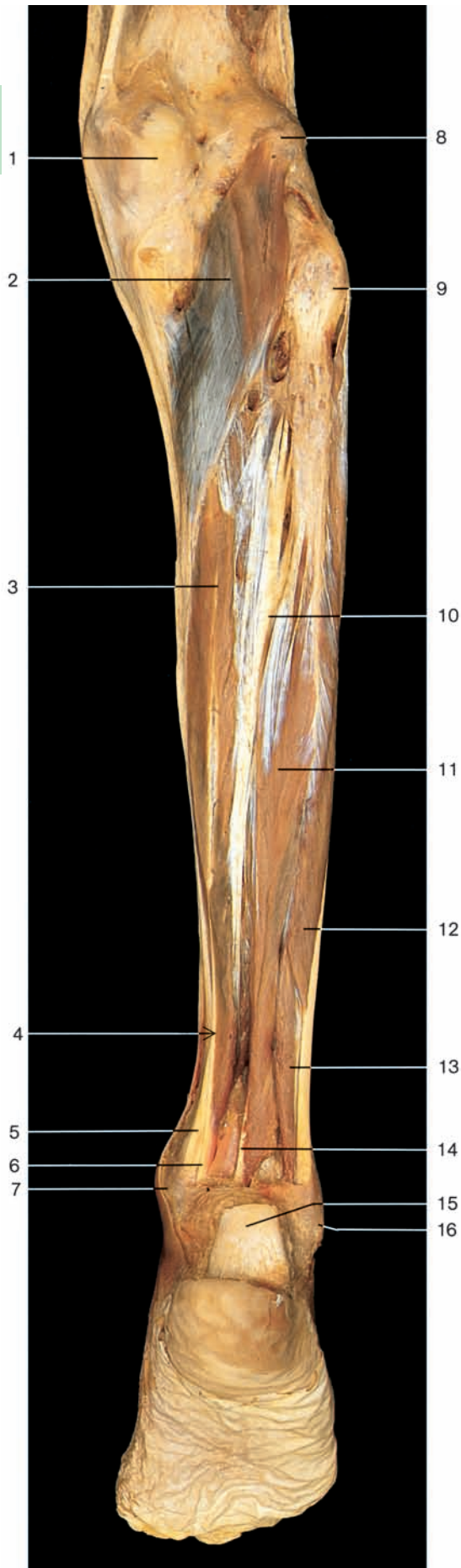


Axial section through the right leg distally of the knee joint (MRI scan). (From Heuck et al., MRT-Atlas, 2009.)

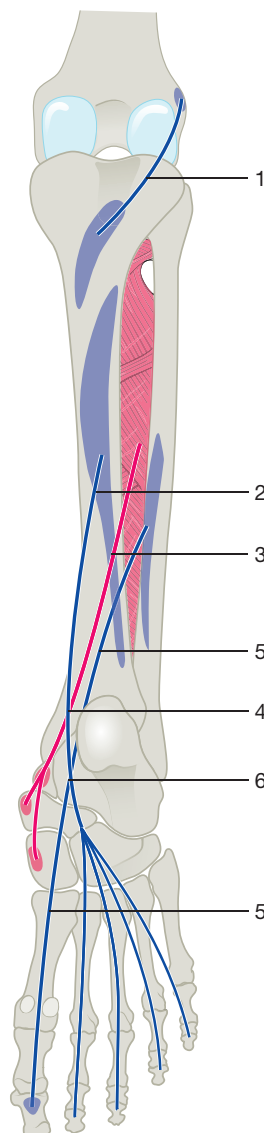


Axial section through the right leg cranially of the ankle joint (MRI scan). (From Heuck et al., MRT-Atlas, 2009.)

- | | | |
|--|-------------------------------------|--|
| 1 Common fibular nerve | 10 Extensor digitorum brevis muscle | 19 Tendon of extensor hallucis longus muscle |
| 2 Head of fibula | 11 Tendon of peroneus brevis muscle | 20 Tendons of extensor digitorum longus muscle |
| 3 Lateral head of gastrocnemius muscle | 12 Patella | 21 Great saphenous vein |
| 4 Soleus muscle | 13 Patellar ligament | 22 Medial head of gastrocnemius muscle |
| 5 Peroneus longus muscle | 14 Tuberosity of tibia | 23 Tibia |
| 6 Peroneus brevis muscle | 15 Tibialis anterior muscle | 24 Popliteus muscle |
| 7 Calcaneal or Achilles tendon | 16 Extensor digitorum longus muscle | 25 Tibial nerve, popliteal artery, and veins |
| 8 Lateral malleolus muscle | 17 Superior extensor retinaculum | 26 Flexor hallucis longus muscle |
| 9 Tendon of peroneus longus muscle | 18 Inferior extensor retinaculum | |



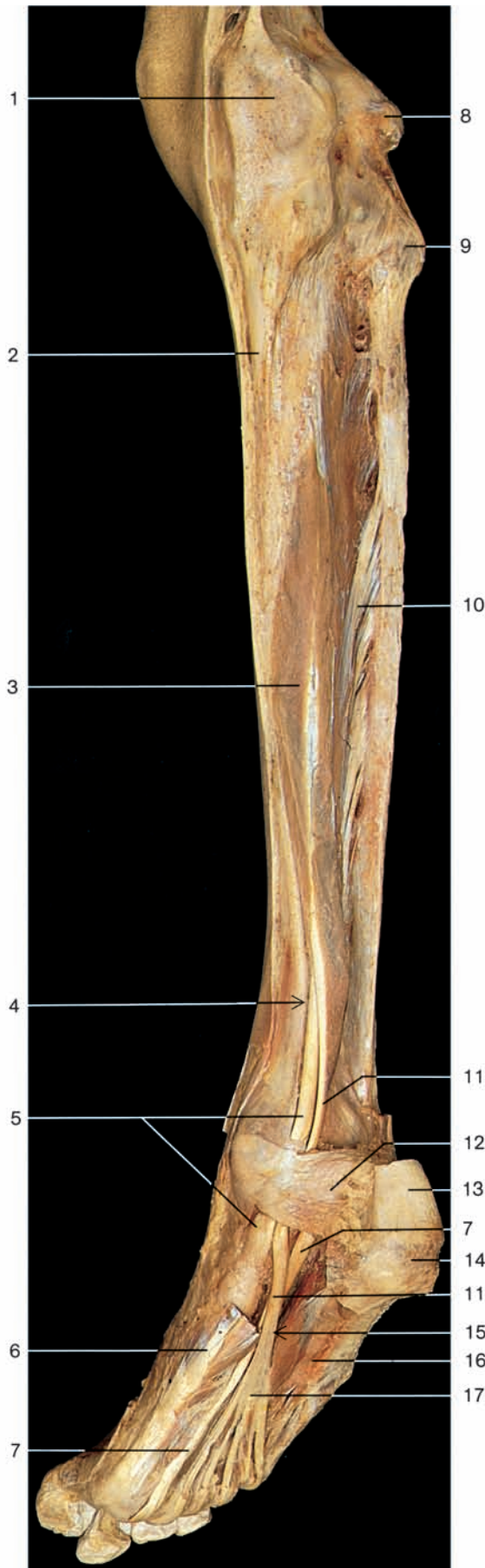
- 1 Medial condyle of femur
- 2 Popliteus muscle
- 3 Flexor digitorum longus muscle
- 4 Crossing of tendons in the leg
- 5 Tendon of tibialis posterior muscle
- 6 Tendon of flexor digitorum longus muscle
- 7 Medial malleolus
- 8 Lateral condyle of femur
- 9 Head of fibula
- 10 Tibialis posterior muscle
- 11 Flexor hallucis longus muscle
- 12 Peroneus longus muscle
- 13 Peroneus brevis muscle
- 14 Tendon of flexor hallucis longus muscle
- 15 Calcaneal or Achilles tendon (divided)
- 16 Lateral malleolus



- 1 Popliteus muscle (blue)
- 2 Flexor digitorum longus muscle (blue)
- 3 Tibialis posterior muscle (red)
- 4 Crossing of tendons in the leg
- 5 Flexor hallucis longus muscle (blue)
- 6 Crossing of tendons in the sole

Deep flexor muscles of leg and foot (right side, posterior aspect).

Course of the deep flexor muscles of the leg (posterior aspect).



Deep flexor muscles of leg and foot (right side, posterior oblique-medial aspect). Flexor digitorum brevis and flexor hallucis longus muscles have been removed.



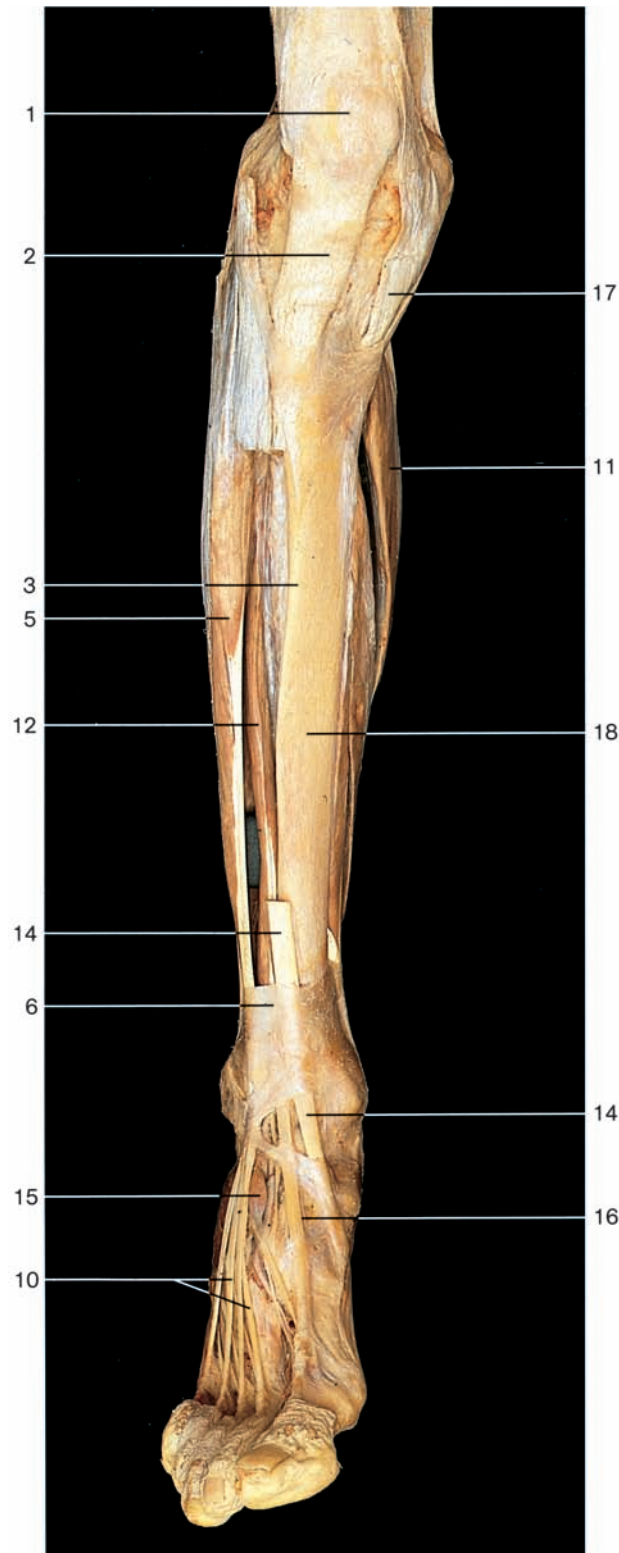
Coronal section through the leg (MRI scan). (From Heuck et al., MRT-Atlas, 2009.)



Sole of the right foot with tendons of long flexor muscles (oblique-medial and inferior aspect).

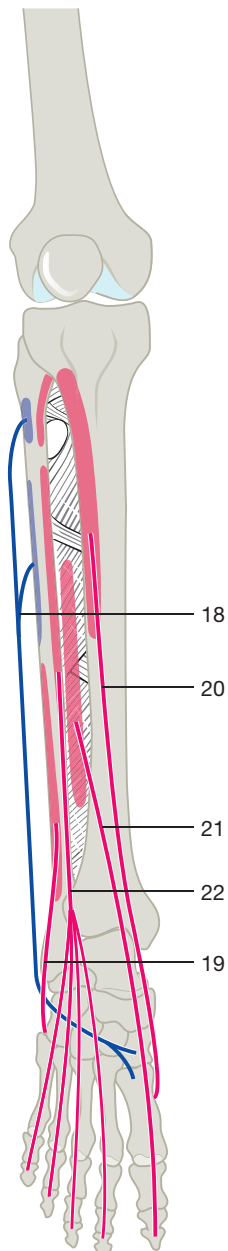


Extensor muscles of leg and foot (right side, oblique antero-lateral aspect).

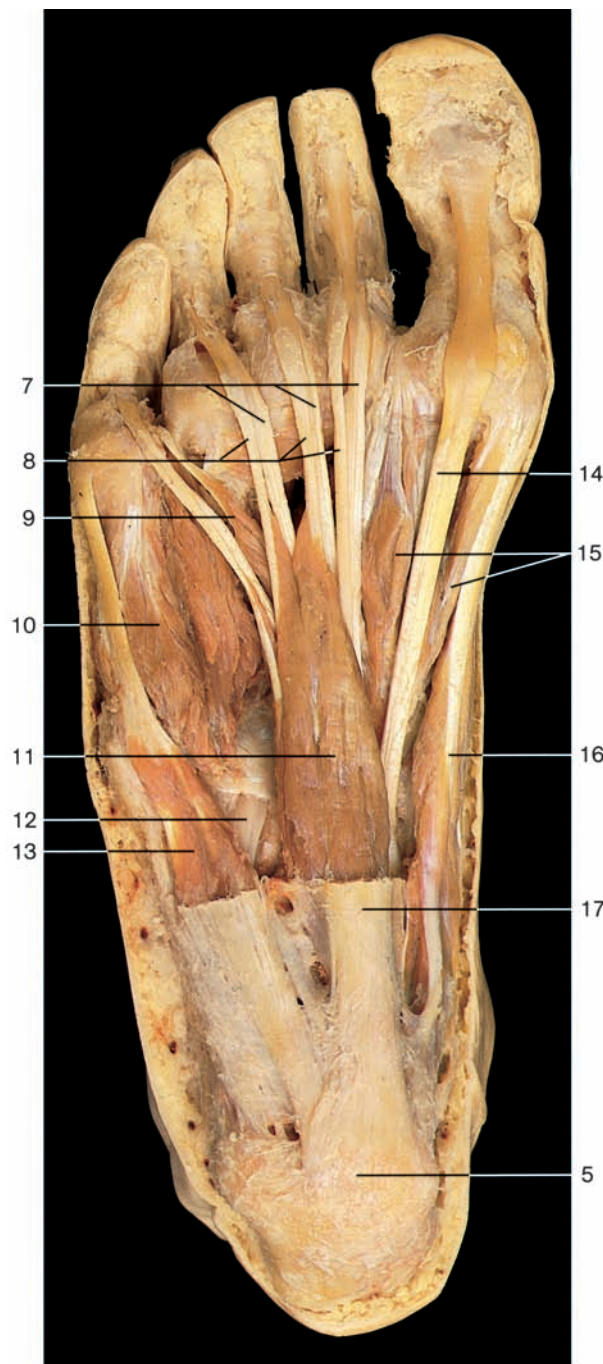


Extensor muscles of leg and foot (right side, anterior aspect). Part of the tibialis anterior muscle has been removed.

- | | | |
|------------------------------------|--|---|
| 1 Patella | 8 Tendon of peroneus tertius muscle | 14 Tendon of tibialis anterior muscle |
| 2 Patellar ligament | 9 Extensor digitorum brevis muscle | 15 Extensor hallucis brevis muscle |
| 3 Anterior margin of tibia | 10 Tendons of extensor digitorum longus muscle | 16 Tendon of extensor hallucis longus muscle |
| 4 Tibialis anterior muscle | 11 Soleus muscle | 17 Common tendon of gracilis, semitendinosus, and sartorius muscles (pes anserinus) |
| 5 Extensor digitorum longus muscle | 12 Extensor hallucis longus muscle | 18 Tibia |
| 6 Superior extensor retinaculum | 13 Medial malleolus | |
| 7 Inferior extensor retinaculum | | |

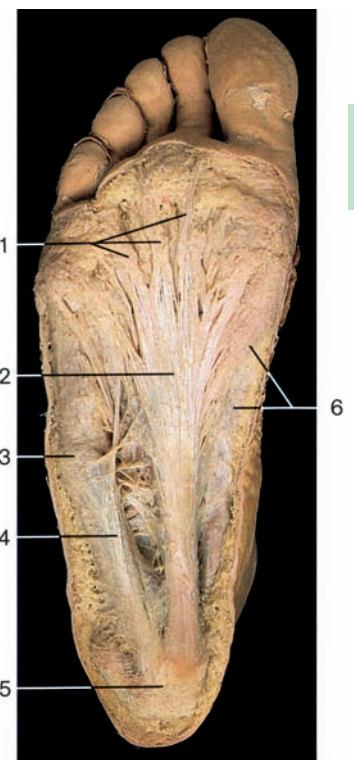


Course of the extensor muscles of the leg (anterior aspect).

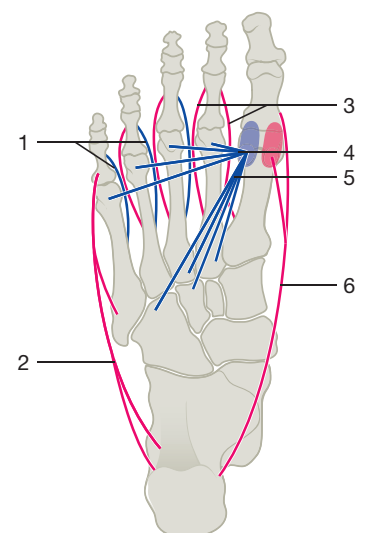
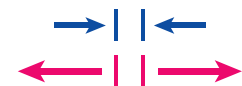


Muscles of the sole of foot, superficial layer. The plantar aponeurosis and the fasciae of the superficial muscles have been removed.

- | | |
|---|--|
| 1 Longitudinal bands of plantar aponeurosis | 12 Tendon of peroneus longus muscle |
| 2 Plantar aponeurosis | 13 Abductor digiti minimi muscle |
| 3 Position of tuberosity of fifth metatarsal bone | 14 Tendon of flexor hallucis longus muscle |
| 4 Muscles of fifth toe with fascia | 15 Flexor hallucis brevis muscle |
| 5 Calcaneal tuberosity | 16 Abductor hallucis muscle |
| 6 Muscles of great toe with fascia | 17 Plantar aponeurosis (cut) |
| 7 Tendons of flexor digitorum longus muscle | 18 Peroneus longus muscle |
| 8 Tendons of flexor digitorum brevis muscle | 19 Peroneus brevis muscle |
| 9 Lumbrical muscle | 20 Tibialis anterior muscle |
| 10 Flexor digiti minimi brevis muscle | 21 Extensor hallucis longus muscle |
| 11 Flexor digitorum brevis muscle | 22 Extensor digitorum longus muscle |



Sole of the foot with the plantar aponeurosis.

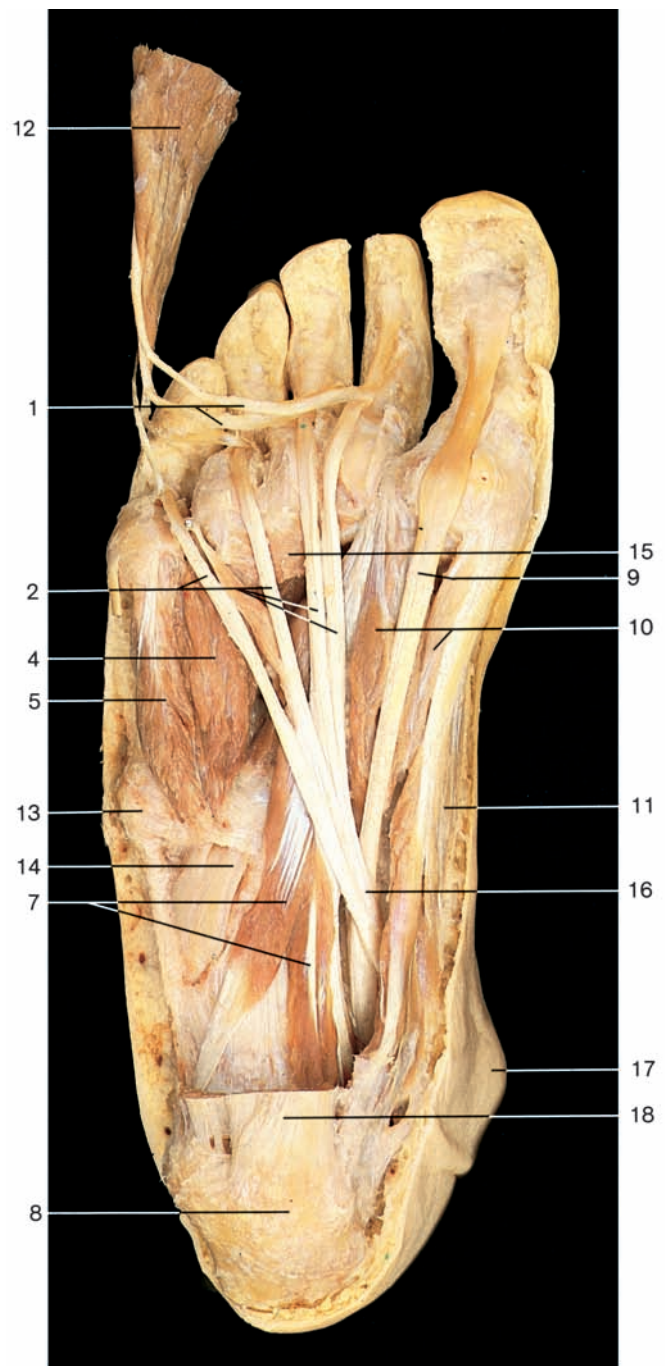


Course of abductor and adductor muscles of the foot (plantar aspect). Red arrows: abduction; blue arrows: adduction.

- | |
|--|
| 1 Plantar interossei muscles (blue) |
| 2 Abductor digiti minimi muscle (red) |
| 3 Dorsal interossei muscles (red) |
| 4 Transverse head of adductor hallucis muscle (blue) |
| 5 Oblique head of adductor hallucis muscle (blue) |
| 6 Abductor hallucis muscle (red) |



Muscles of the sole of foot, middle layer. The flexor digitorum brevis muscle has been divided.

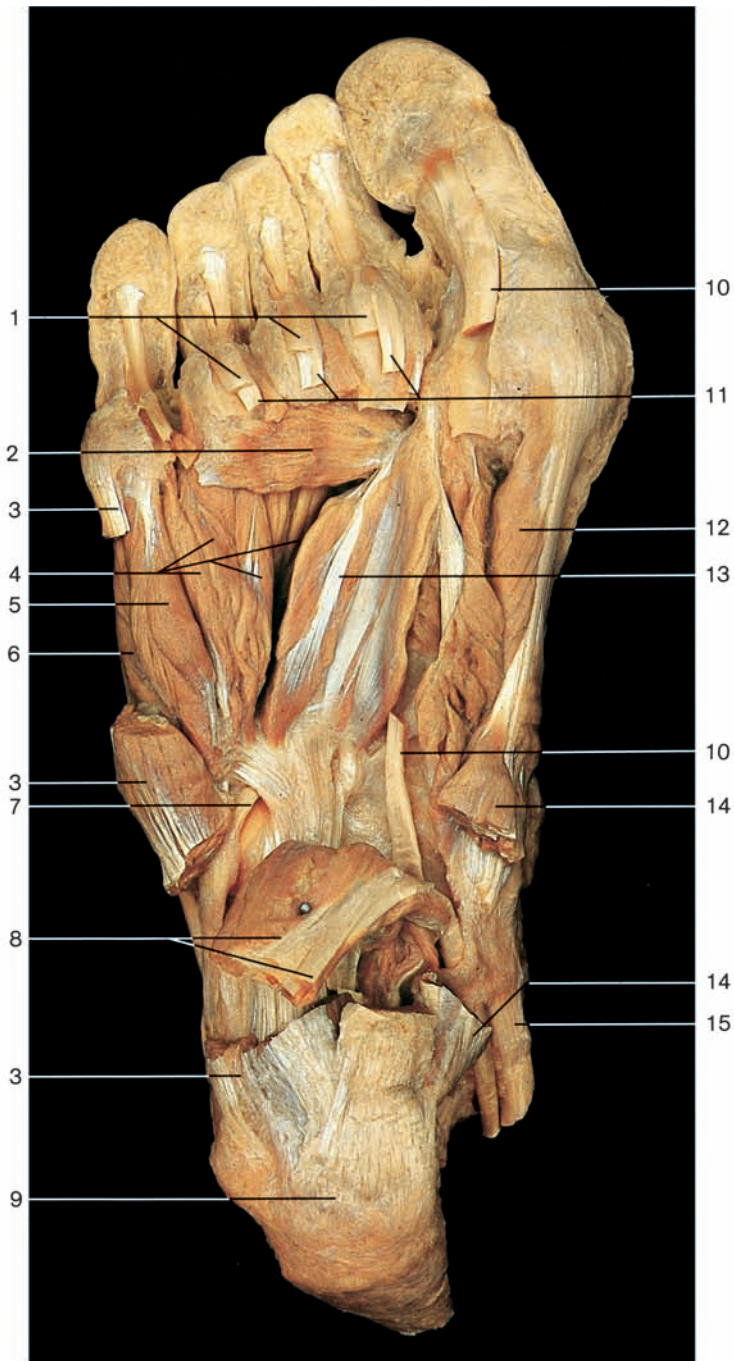


Muscles of the sole of foot, middle layer. The tendons of the flexor muscles and the crossing of tendons are displayed. The flexor digitorum brevis muscle has been divided and reflected.

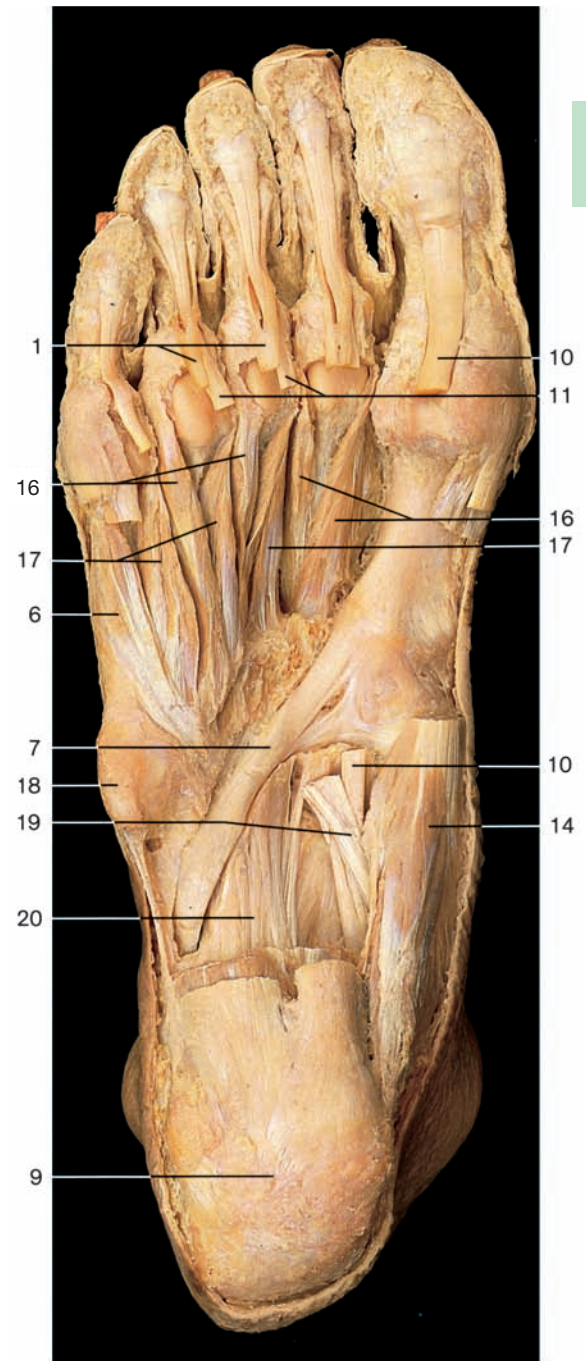
- 1 Tendons of flexor digitorum brevis muscle
- 2 Tendons of flexor digitorum longus muscle
- 3 Lumbrical muscles
- 4 Interossei muscles
- 5 Flexor digiti minimi brevis muscle
- 6 Abductor digiti minimi muscle
- 7 Quadratus plantae muscle

- 8 Calcaneal tuberosity
- 9 Tendon of flexor hallucis longus muscle
- 10 Flexor hallucis brevis muscle
- 11 Abductor hallucis muscle
- 12 Flexor digitorum brevis muscle (divided)
- 13 Tuberosity of fifth metatarsal bone
- 14 Tendon of peroneus longus muscle

- 15 Transverse head of adductor hallucis muscle
- 16 Crossing of tendons in the sole of foot
- 17 Medial malleolus
- 18 Plantar aponeurosis (divided)



Muscles of the sole of foot, deep layer. The flexor digitorum brevis muscle has been removed, and the quadratus plantae, abductor hallucis, and digiti minimi muscles have been divided.

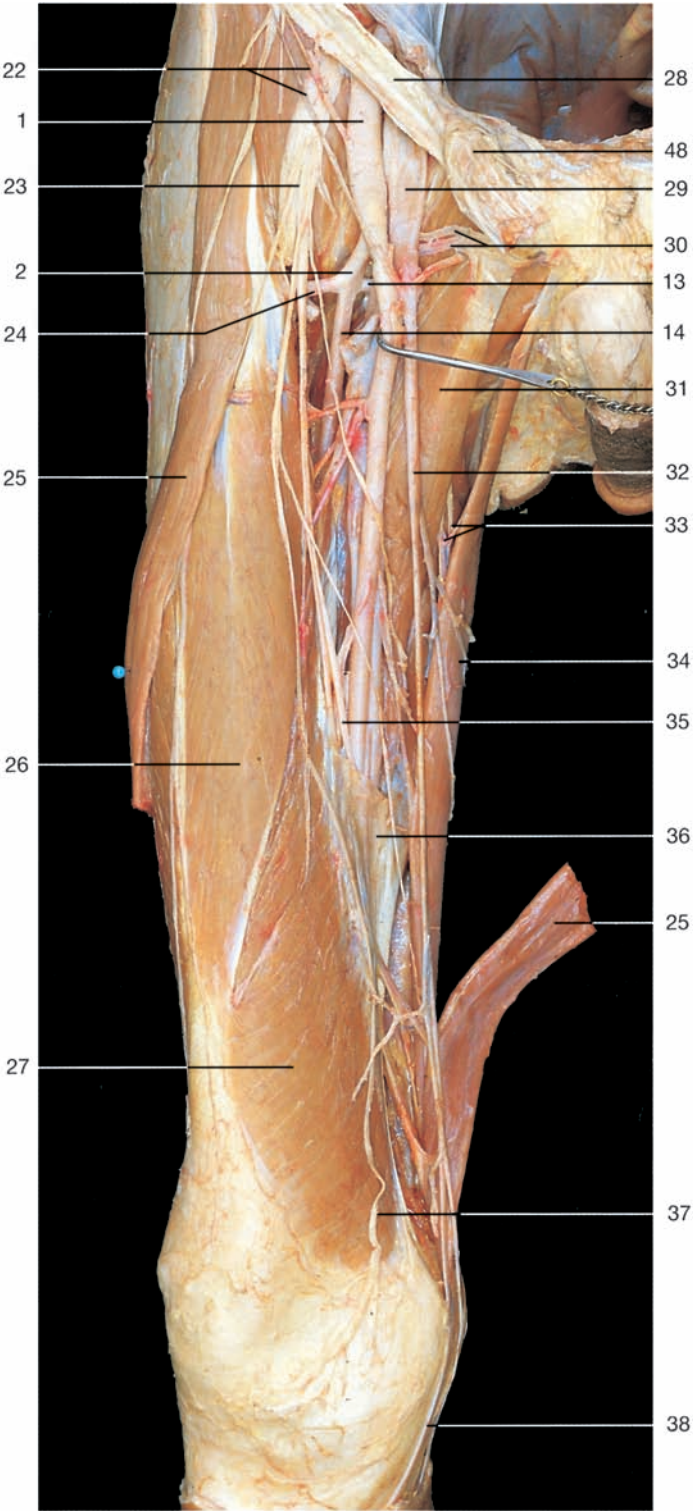


Muscles of the sole of foot, deepest layer. The interossei muscles and the canal for the tendon of the peroneus longus muscle are shown.

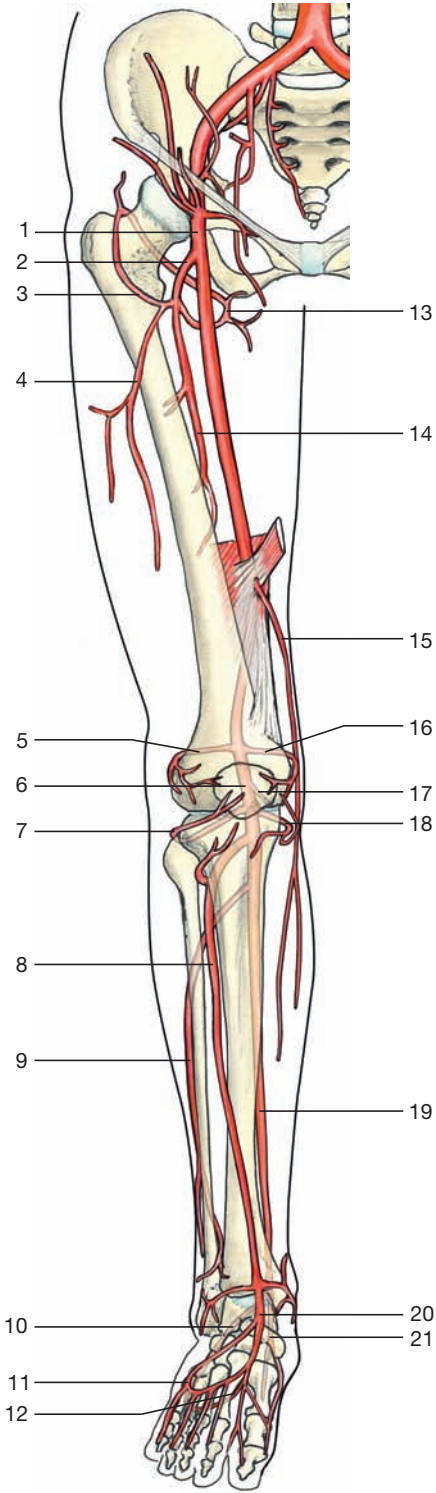
- 1 Tendons of flexor digitorum brevis muscle
- 2 Transverse head of adductor hallucis muscle
- 3 Abductor digiti minimi muscle
- 4 Interossei muscles
- 5 Flexor digiti minimi brevis muscle
- 6 Opponens digiti minimi muscle
- 7 Tendon of peroneus longus muscle
- 8 Quadratus plantae muscle with tendon of flexor digitorum longus muscle

- 9 Calcaneal tuberosity
- 10 Tendon of flexor hallucis longus muscle (divided)
- 11 Tendons of flexor digitorum longus muscle
- 12 Flexor hallucis brevis muscle
- 13 Oblique head of adductor hallucis muscle
- 14 Abductor hallucis muscle (cut)
- 15 Tendon of tibialis posterior muscle
- 16 Dorsal interossei muscles

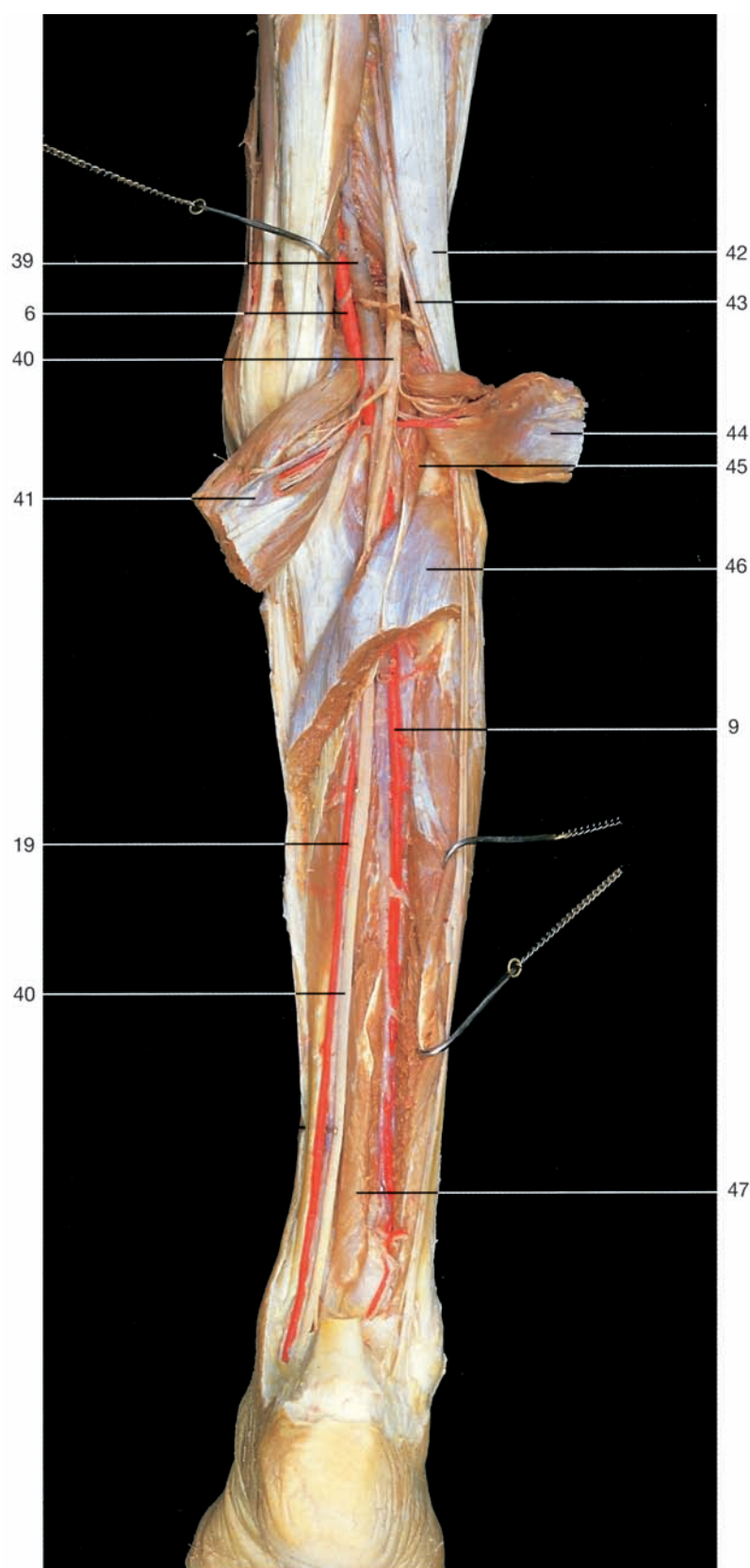
- 17 Plantar interossei muscles
- 18 Tuberosity of fifth metatarsal bone
- 19 Tendon of flexor digitorum longus muscle (crossing of plantar tendons)
- 20 Long plantar ligament



Main arteries and nerves of the thigh (right side, anterior aspect). The sartorius muscle has been divided and reflected. The femoral vein has been partly removed to show the deep femoral artery. Note that the vessels enter the adductor canal to reach the popliteal fossa.

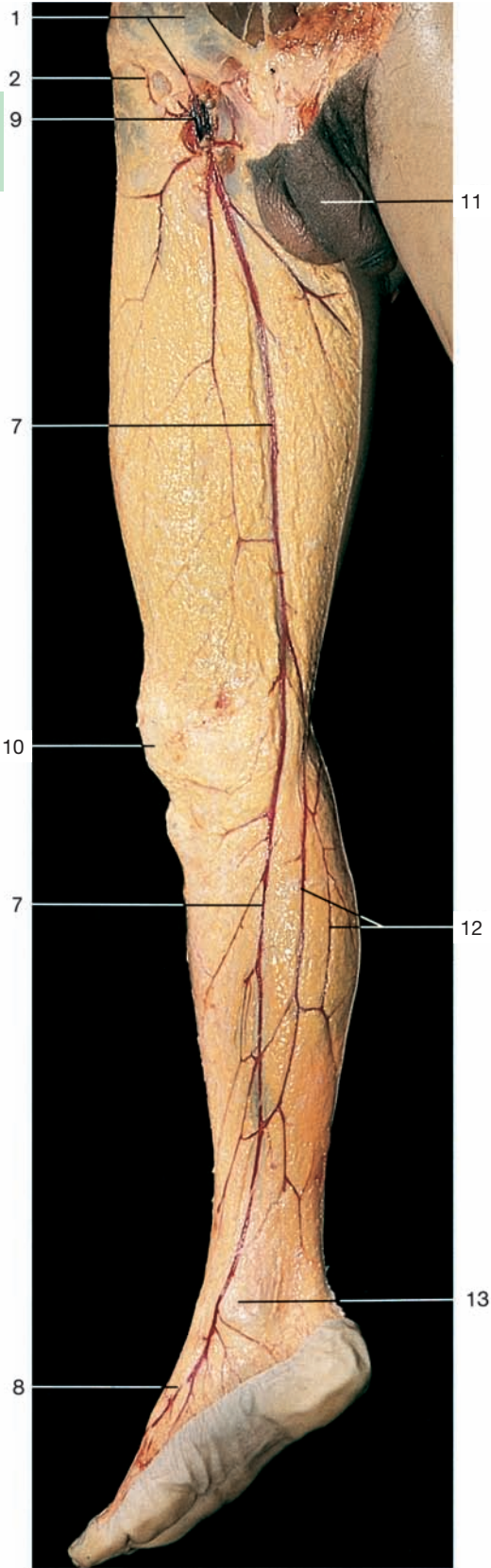


Main arteries of the lower limb (anterior aspect).



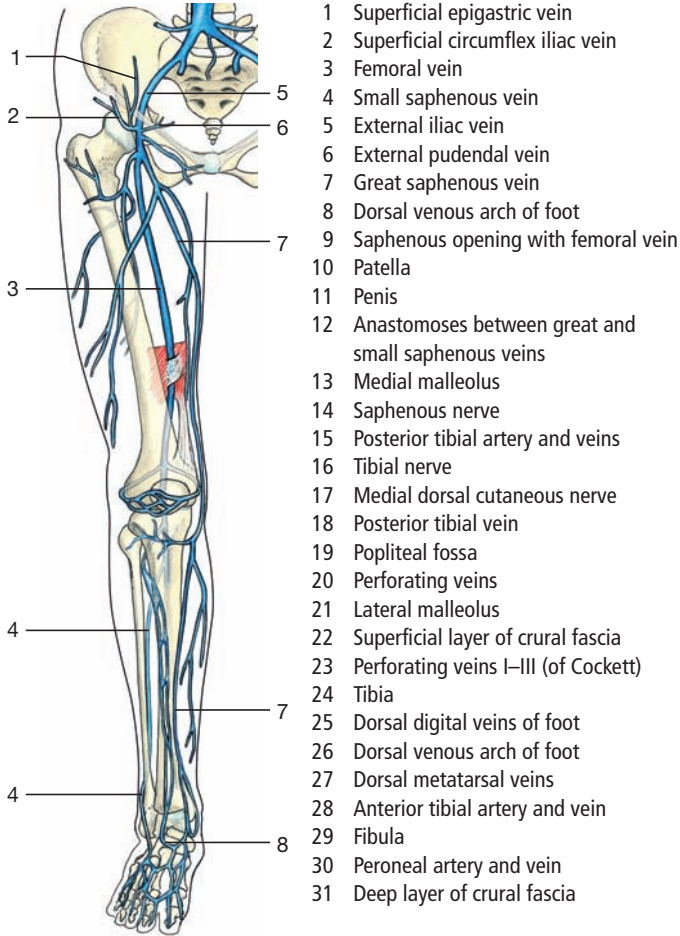
- 1 Femoral artery
- 2 Deep artery of thigh
- 3 Ascending branch of lateral circumflex femoral artery
- 4 Descending branch of lateral circumflex femoral artery
- 5 Lateral superior genicular artery
- 6 Popliteal artery
- 7 Lateral inferior genicular artery
- 8 Anterior tibial artery
- 9 Peroneal artery
- 10 Lateral plantar artery
- 11 Arcuate artery with dorsal metatarsal arteries
- 12 Plantar arch with plantar metatarsal arteries
- 13 Medial circumflex femoral artery
- 14 Deep artery of thigh with perforating arteries
- 15 Descending genicular artery
- 16 Medial superior genicular artery
- 17 Middle genicular artery
- 18 Medial inferior genicular artery
- 19 Posterior tibial artery
- 20 Dorsalis pedis artery
- 21 Medial plantar artery
- 22 Superficial and deep circumflex iliac arteries
- 23 Femoral nerve
- 24 Lateral circumflex femoral artery
- 25 Sartorius muscle (cut and reflected)
- 26 Rectus femoris muscle
- 27 Vastus medialis muscle
- 28 Inguinal ligament
- 29 Femoral vein (cut)
- 30 External pudendal artery and vein
- 31 Adductor longus muscle
- 32 Great saphenous vein
- 33 Obturator artery and nerve
- 34 Gracilis muscle
- 35 Saphenous nerve
- 36 Vasto-adductor membrane
- 37 Anterior cutaneous branch of femoral nerve
- 38 Infrapatellar branch of saphenous nerve
- 39 Popliteal vein
- 40 Tibial nerve
- 41 Medial head of gastrocnemius muscle
- 42 Biceps femoris muscle
- 43 Common fibular nerve
- 44 Lateral head of gastrocnemius muscle
- 45 Plantaris muscle
- 46 Soleus muscle
- 47 Flexor hallucis longus muscle
- 48 Spermatic cord

Arteries of the leg (right side, posterior aspect).

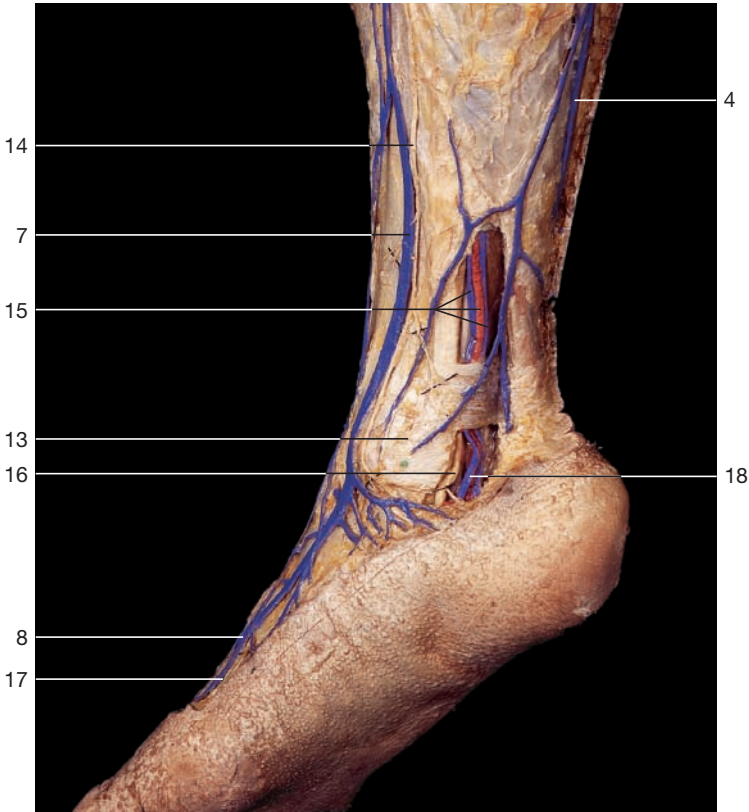


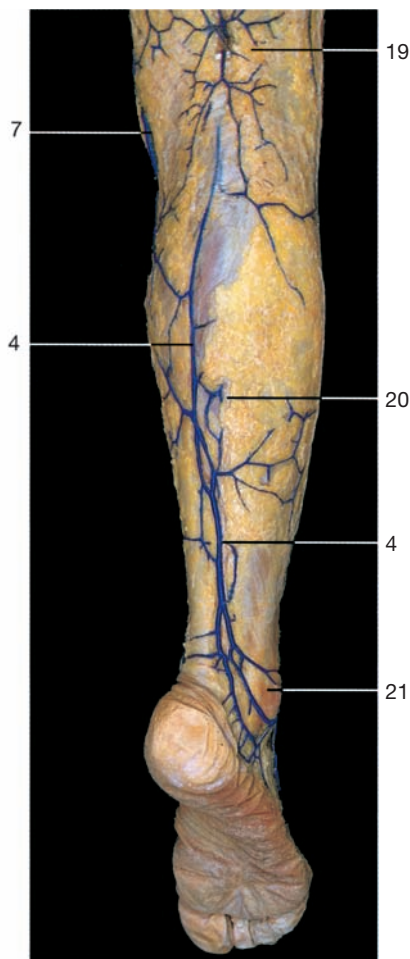
Superficial veins of the lower limb (right side, medio-anterior aspect). The veins have been injected with red solution.

Medial malleolar region of the right foot. ▷ Dissection of tibial nerve, posterior tibial vessels, and great saphenous vein. The veins have been injected with blue resin.

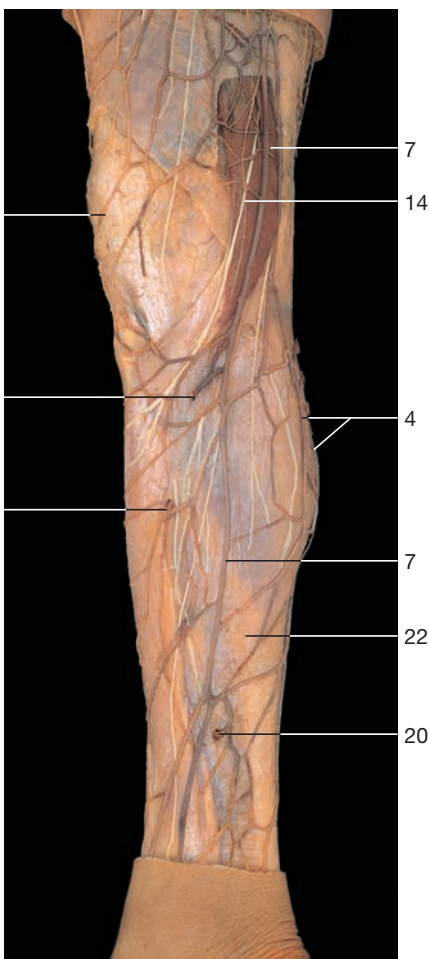


Main trunkal veins of the lower limb (anterior aspect).

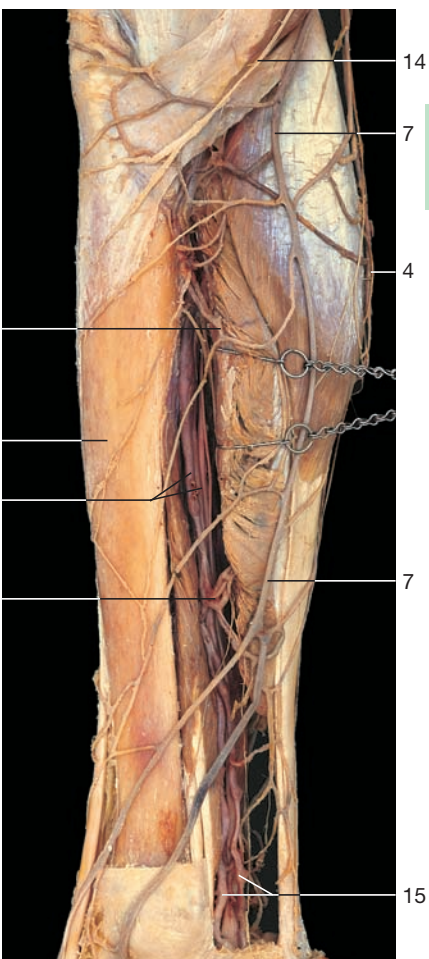




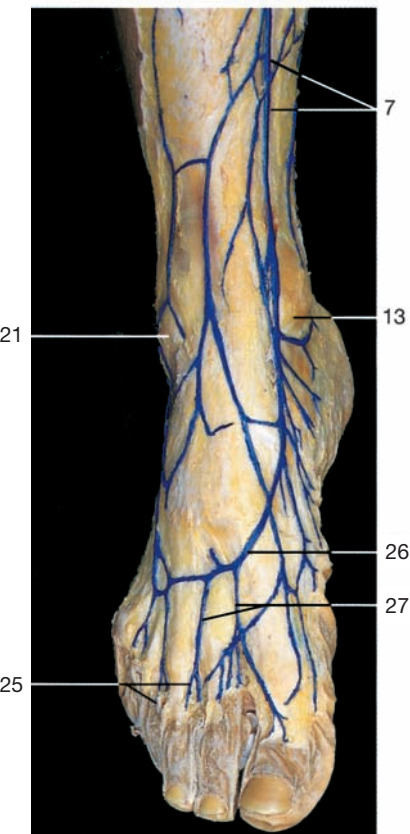
Superficial veins of the leg (right side, posterior aspect). The veins have been injected with blue resin.



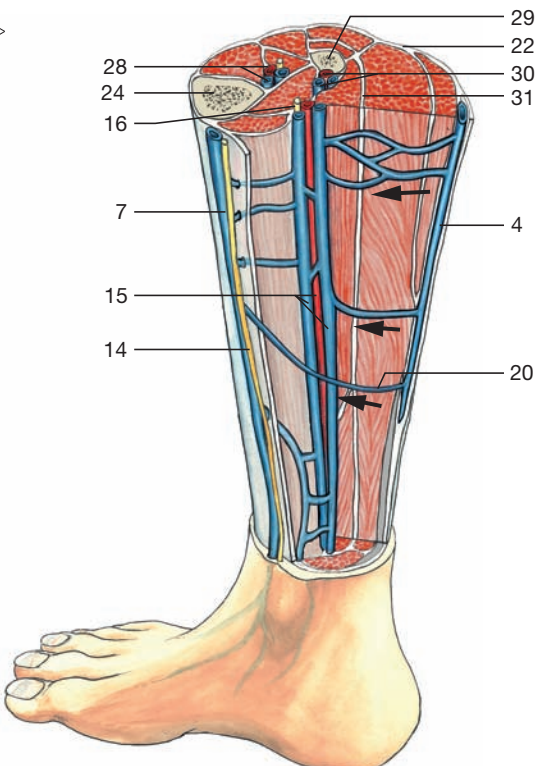
Superficial veins of the leg (left side, medial aspect). The perforating veins of Cockett have been dissected.



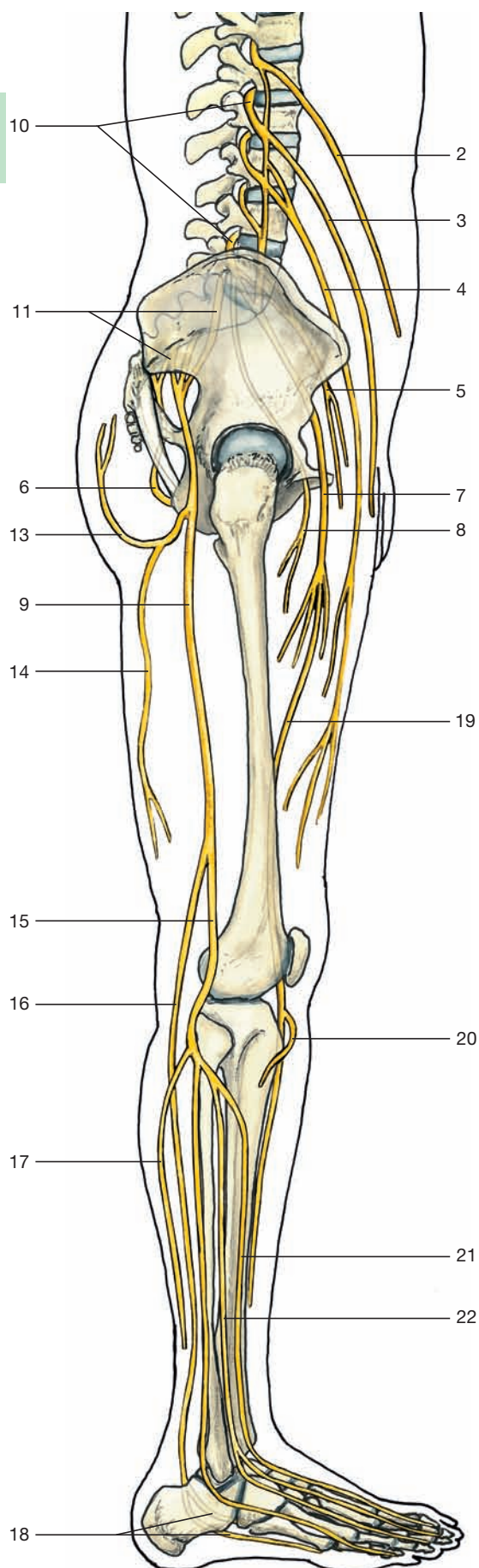
Veins of the leg (left side, medial aspect). The anastomoses between superficial and deeper veins are dissected.



Anastomoses between superficial and deep veins of the leg. Arrows: directions of blood flow.

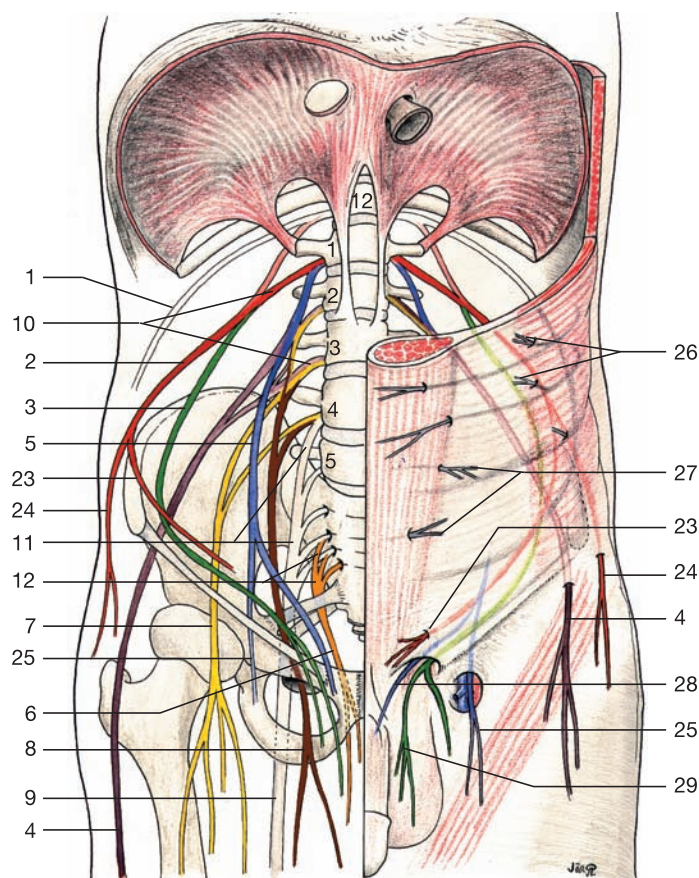


Superficial veins of the dorsum of the right foot. The veins have been injected with blue resin.



Nerves of the lower limb (lateral aspect).

- 1 Subcostal nerve
- 2 Iliohypogastric nerve
- 3 Ilio-inguinal nerve
- 4 Lateral femoral cutaneous nerve
- 5 Genitofemoral nerve
- 6 Pudendal nerve
- 7 Femoral nerve
- 8 Obturator nerve
- 9 Sciatic nerve
- 10 Lumbar plexus (L_1-L_4)
- 11 Sacral plexus (L_4-S_4)
- 12 "Pudendal" plexus (S_2-S_4)
- 13 Inferior cluneal nerves
- 14 Posterior femoral cutaneous nerve
- 15 Common fibular nerve
- 16 Tibial nerve
- 17 Lateral sural cutaneous nerve
- 18 Medial and lateral plantar nerves
- 19 Saphenous nerve
- 20 Infrapatellar branch of saphenous nerve
- 21 Deep fibular nerve
- 22 Superficial fibular nerve
- 23 Anterior cutaneous branch of iliohypogastric nerve
- 24 Lateral cutaneous branch of iliohypogastric nerve
- 25 Femoral branch of genitofemoral nerve
- 26 Lateral cutaneous branches of intercostal nerves
- 27 Anterior cutaneous branches of intercostal nerves
- 28 Genital branch of genitofemoral nerve
- 29 Anterior scrotal nerves

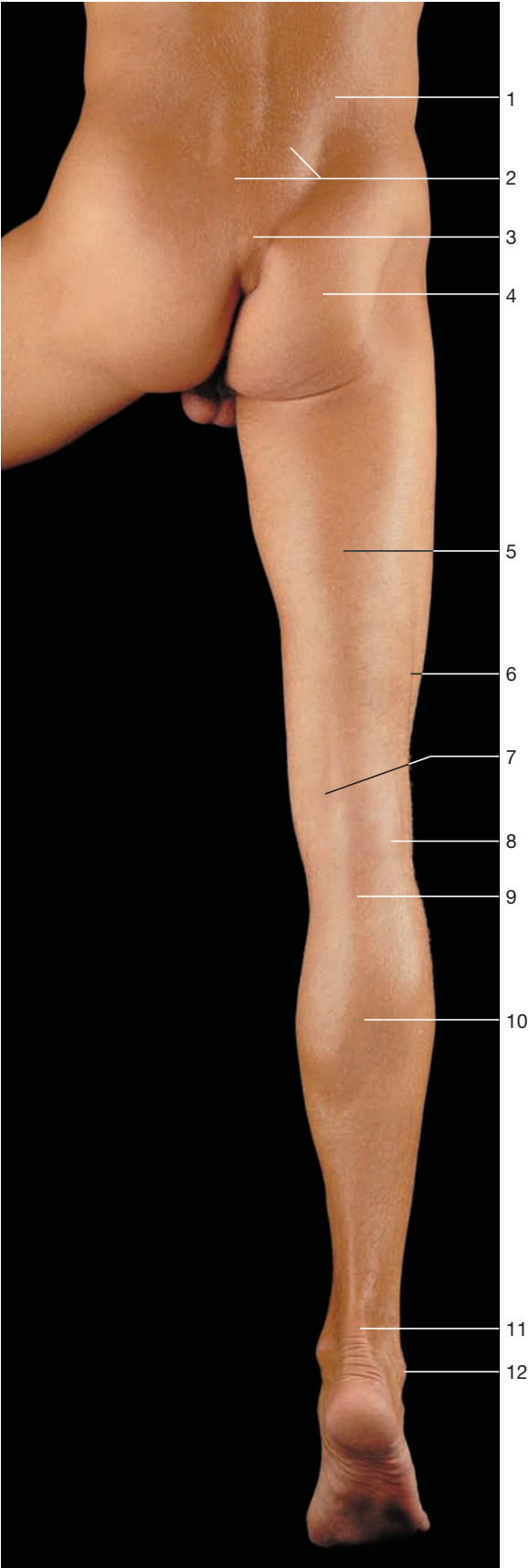


Main branches of the lumbosacral plexus (anterior aspect).

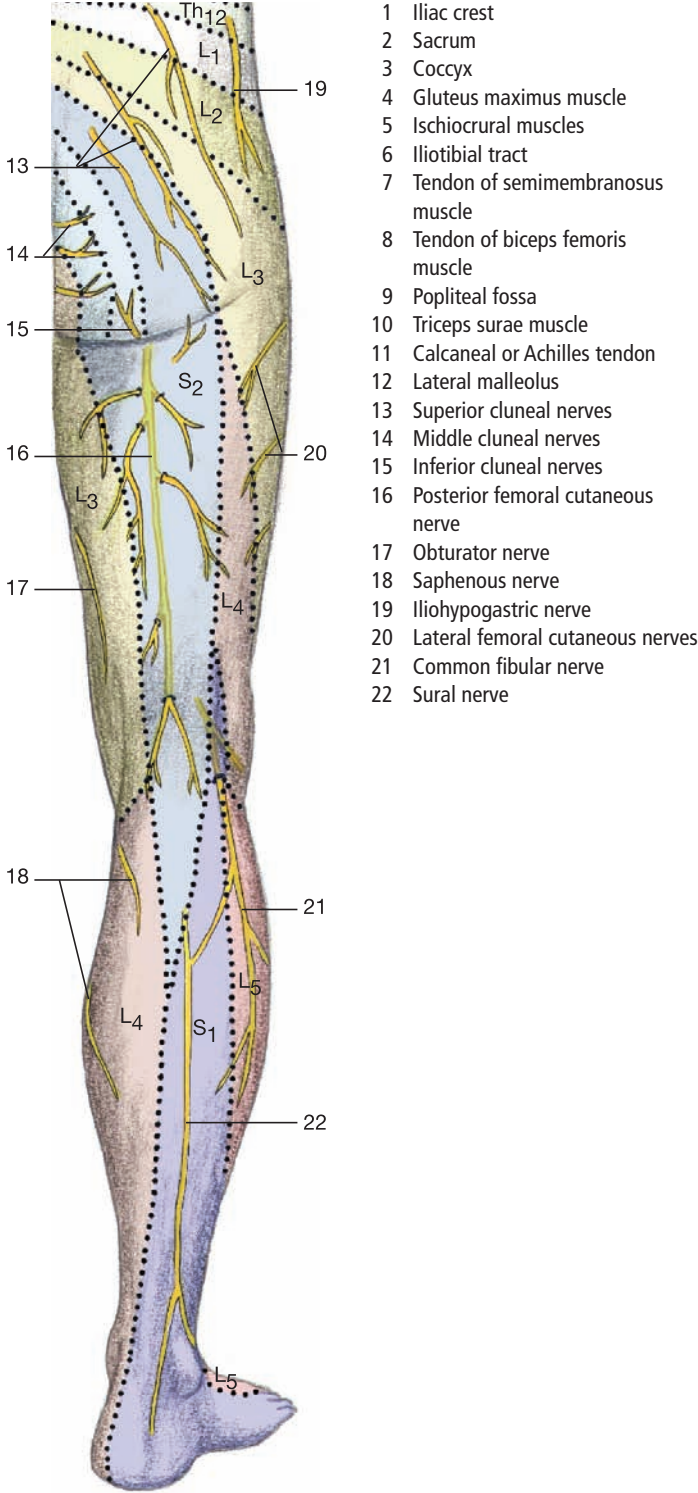


- 1 Transverse abdominal muscle
- 2 Iliohypogastric nerve
- 3 Ilio-inguinal nerve
- 4 Femoral nerve
- 5 Lateral femoral cutaneous nerve
- 6 Obturator nerve
- 7 Obturator internus muscle
- 8 Pubis (cut edge)
- 9 Levator ani muscle (remnant)
- 10 Dorsal nerve of penis
- 11 Posterior scrotal nerves of pudendal nerve
- 12 Adductor longus muscle
- 13 Gracilis muscle
- 14 Body of fourth lumbar vertebra
- 15 Cauda equina
- 16 Intervertebral disc
- 17 Sacral promontory
- 18 Sympathetic trunk
- 19 Sacrum
- 20 Lumbosacral trunk
- 21 Sacral plexus
- 22 Coccyx
- 23 Sacrospinous ligament
- 24 Pudendal nerve
- 25 Inferior rectal nerves
- 26 Perineal nerves of pudendal nerve
- 27 Subcutaneous fat tissue of gluteal region

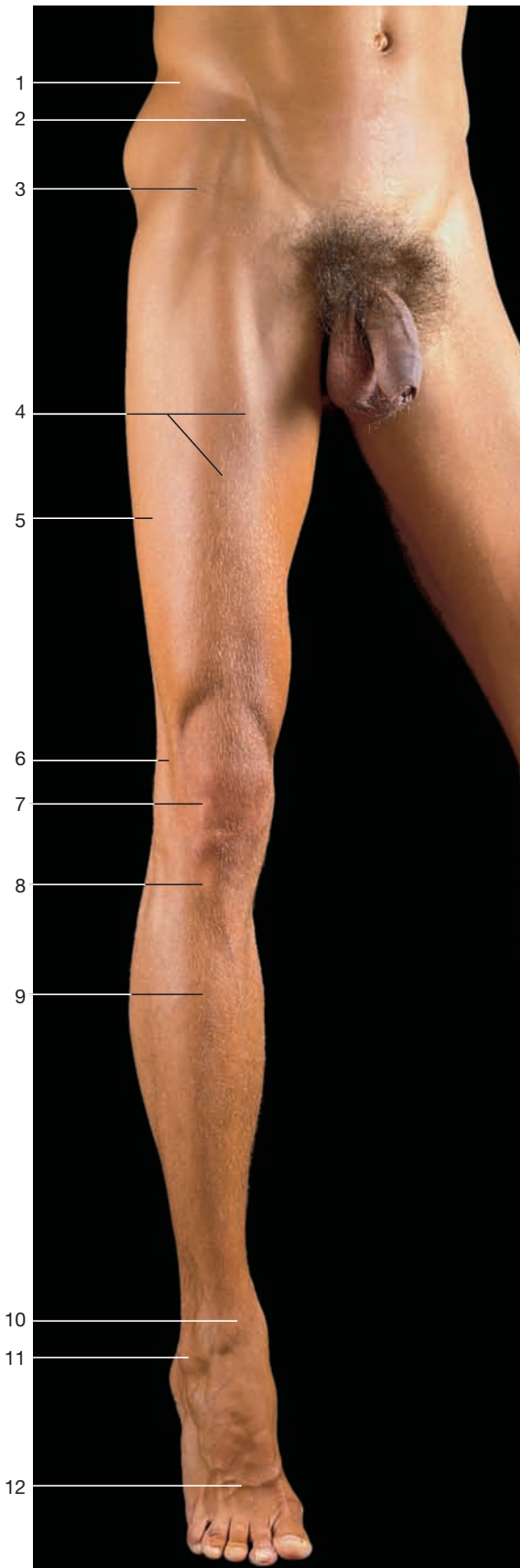
Lumbosacral plexus in situ (right side, medial aspect). The pelvic organs with the peritoneum and part of the levator ani muscle have been removed.



Surface anatomy of the lower limb (right side, posterior aspect). The gluteal muscles are contracted.



Cutaneous nerves of the lower limb (posterior aspect).
Dotted lines = border of segments.

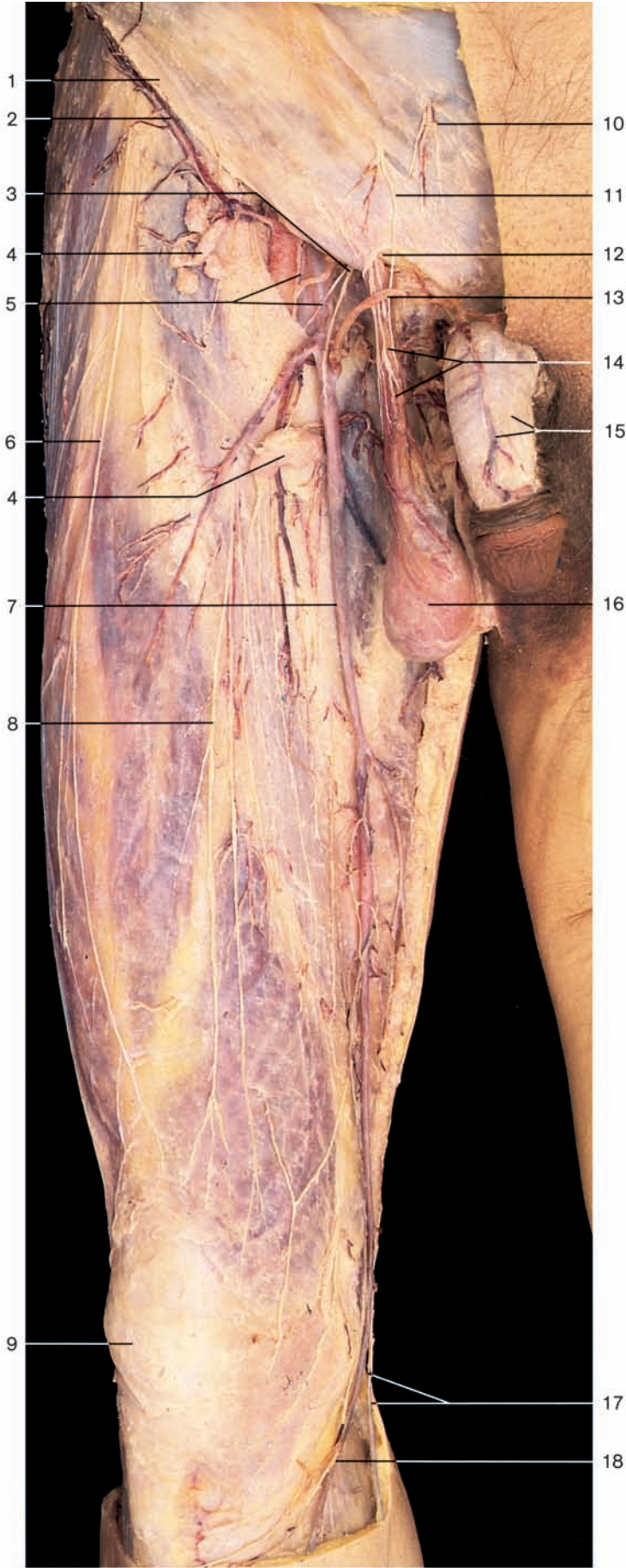


Surface anatomy of the lower limb (right side, anterior aspect).

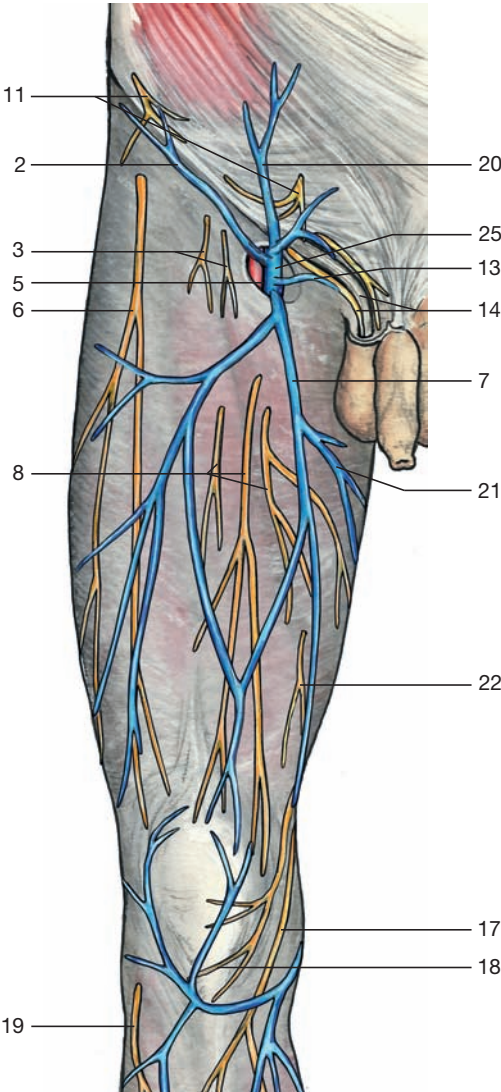


Cutaneous nerves of the lower limb (anterior aspect).
Dotted lines = border of segments.

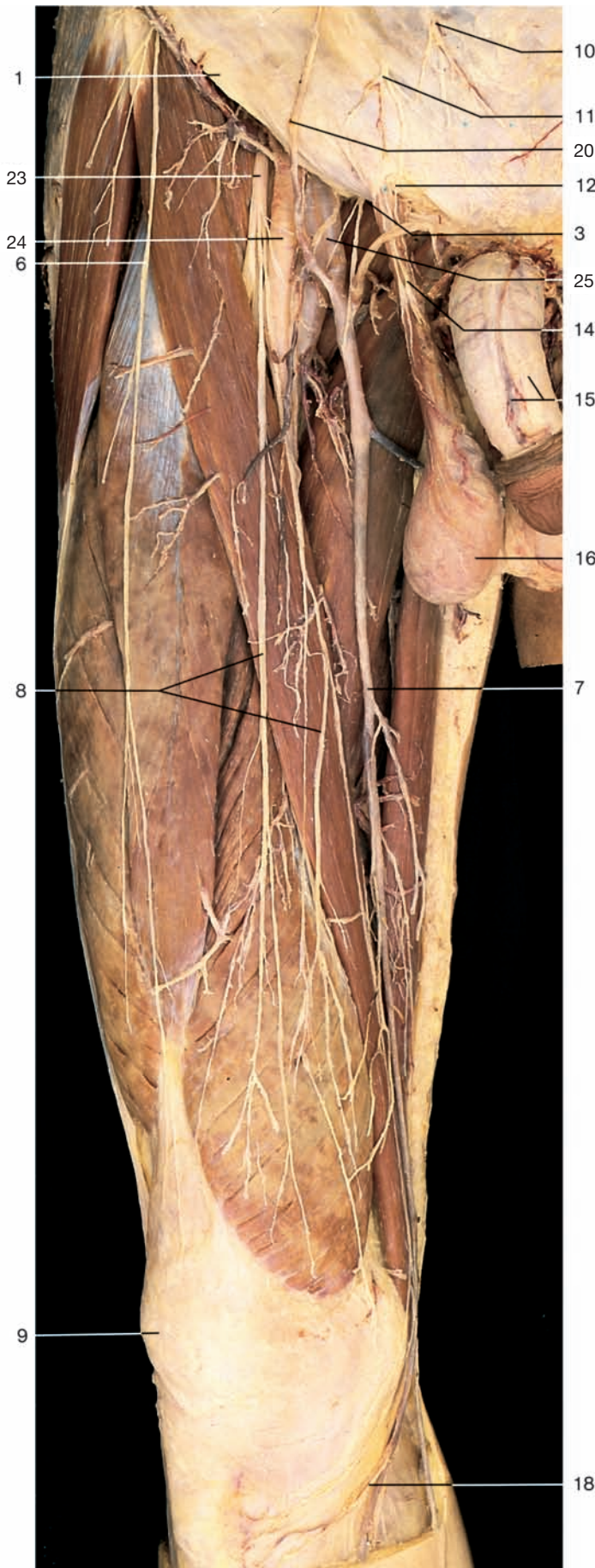




Anterior region of the thigh with cutaneous nerves and veins (right side).

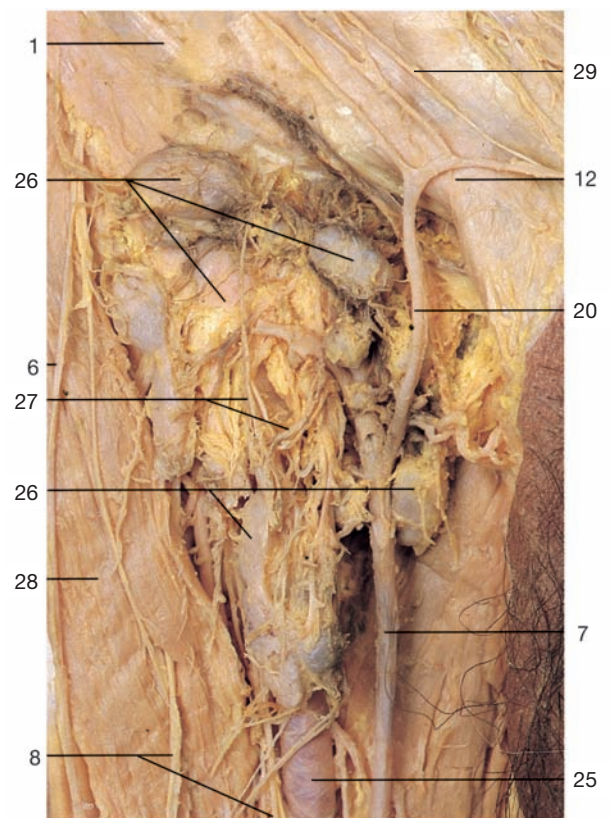


Anterior region of the thigh with cutaneous nerves and veins (right side; compare with the dissection alongside).

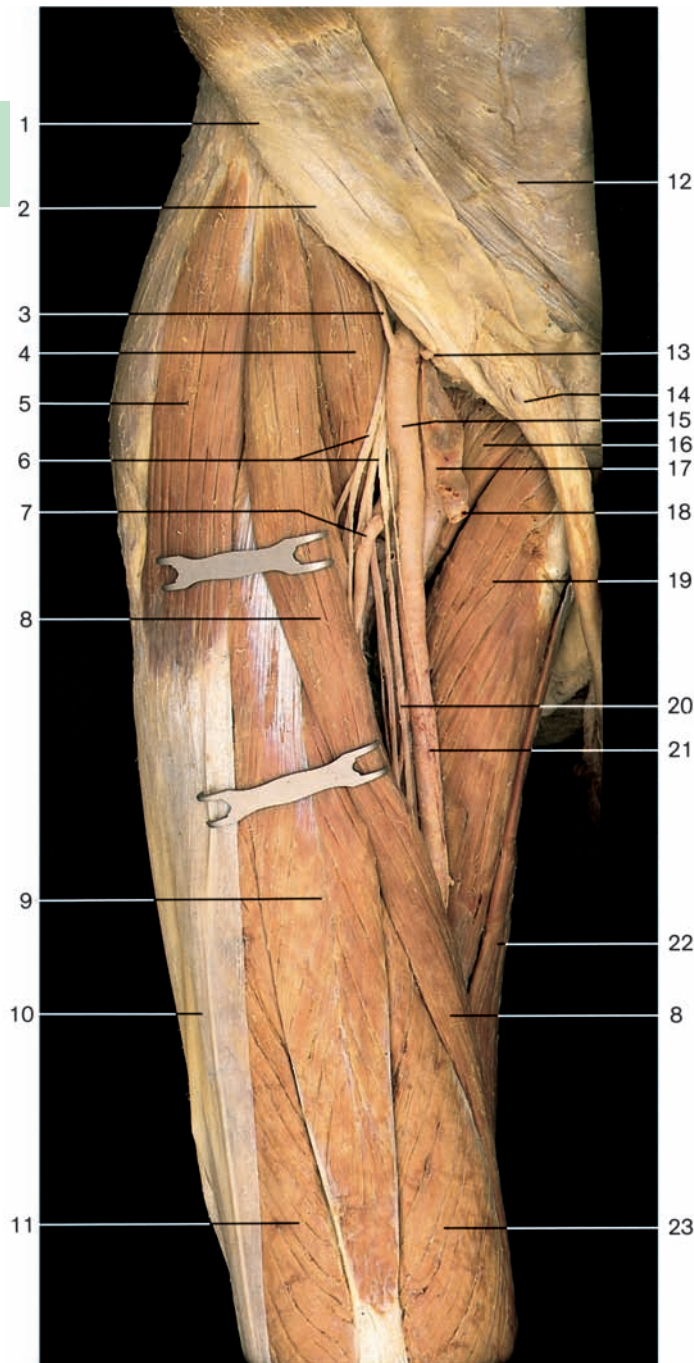


Anterior region of the thigh with cutaneous nerves and veins (right side). The fascia lata and the fasciae of the thigh muscles have been removed.

- 1 Inguinal ligament
- 2 Superficial circumflex iliac vein
- 3 Femoral branch of genitofemoral nerve
- 4 Superficial inguinal lymph nodes
- 5 Saphenous opening with femoral artery and vein
- 6 Lateral femoral cutaneous nerve
- 7 Great saphenous vein
- 8 Anterior cutaneous branches of femoral nerve
- 9 Patella
- 10 Terminal branches of subcostal nerve
- 11 Terminal branches of iliohypogastric nerve
- 12 Superficial inguinal ring
- 13 External pudendal vein
- 14 Spermatic cord with genital branch of genitofemoral nerve
- 15 Penis with superficial dorsal vein of penis
- 16 Testis and its coverings
- 17 Saphenous nerve
- 18 Infrapatellar branch of saphenous nerve
- 19 Lateral sural cutaneous nerve
- 20 Superficial epigastric vein
- 21 Accessory saphenous vein
- 22 Cutaneous branch of obturator nerve
- 23 Femoral nerve
- 24 Femoral artery
- 25 Femoral vein
- 26 Superficial and inferior inguinal lymph nodes (enlarged)
- 27 Lymphatic vessels
- 28 Sartorius muscle
- 29 Iliohypogastric nerve

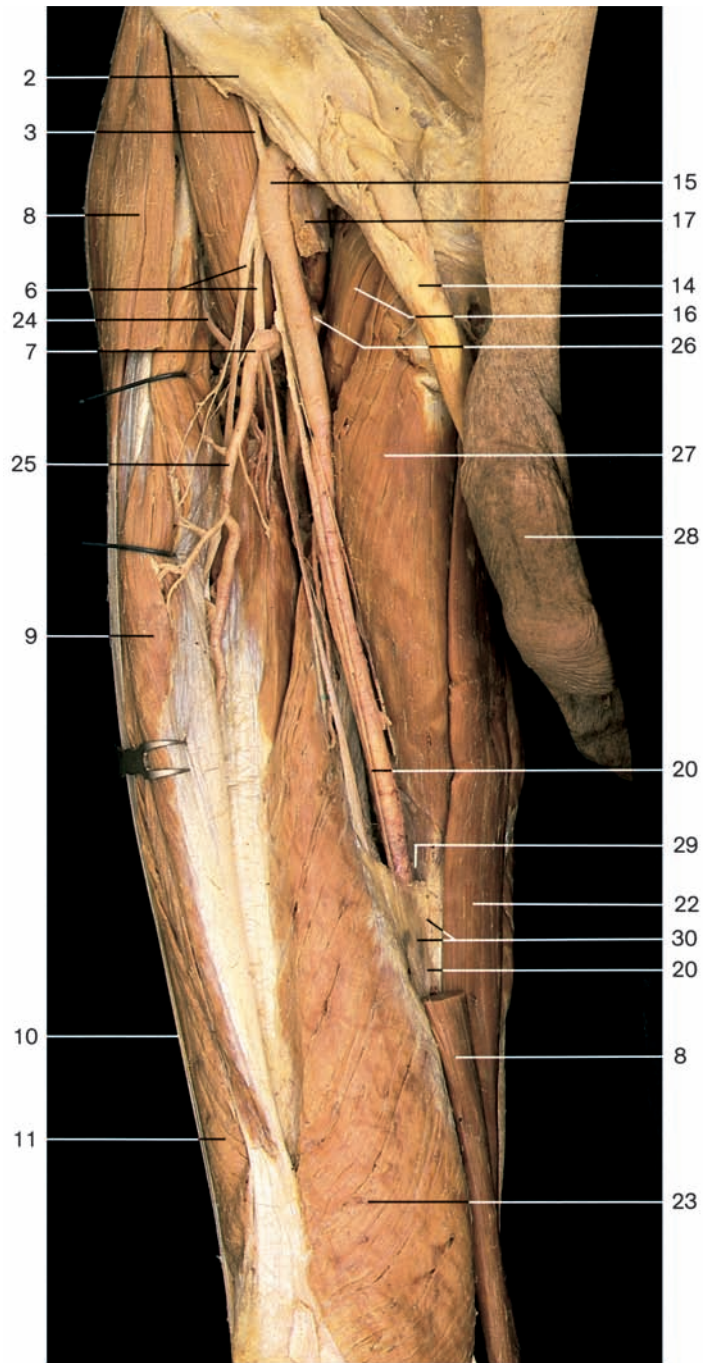


Inguinal nodes with lymphatic vessels (anterior aspect).



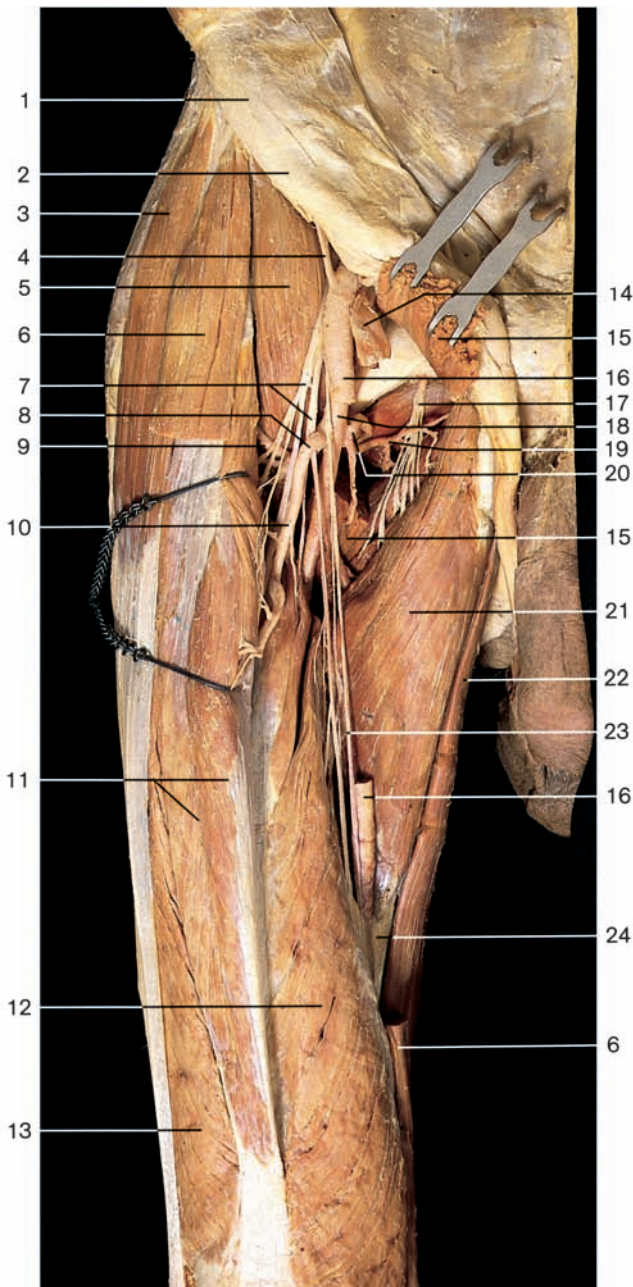
Anterior region of the thigh (right side, anterior aspect). The fascia lata has been removed and the sartorius muscle has been slightly reflected.

- 1 Anterior superior iliac spine
- 2 Inguinal ligament
- 3 Deep circumflex iliac artery
- 4 Iliopsoas muscle
- 5 Tensor fasciae latae muscle
- 6 Femoral nerve
- 7 Lateral circumflex femoral artery
- 8 Sartorius muscle
- 9 Rectus femoris muscle
- 10 Iliotibial tract
- 11 Vastus lateralis muscle
- 12 Anterior sheath of rectus abdominis muscle
- 13 Inferior epigastric artery
- 14 Spermatic cord
- 15 Femoral artery



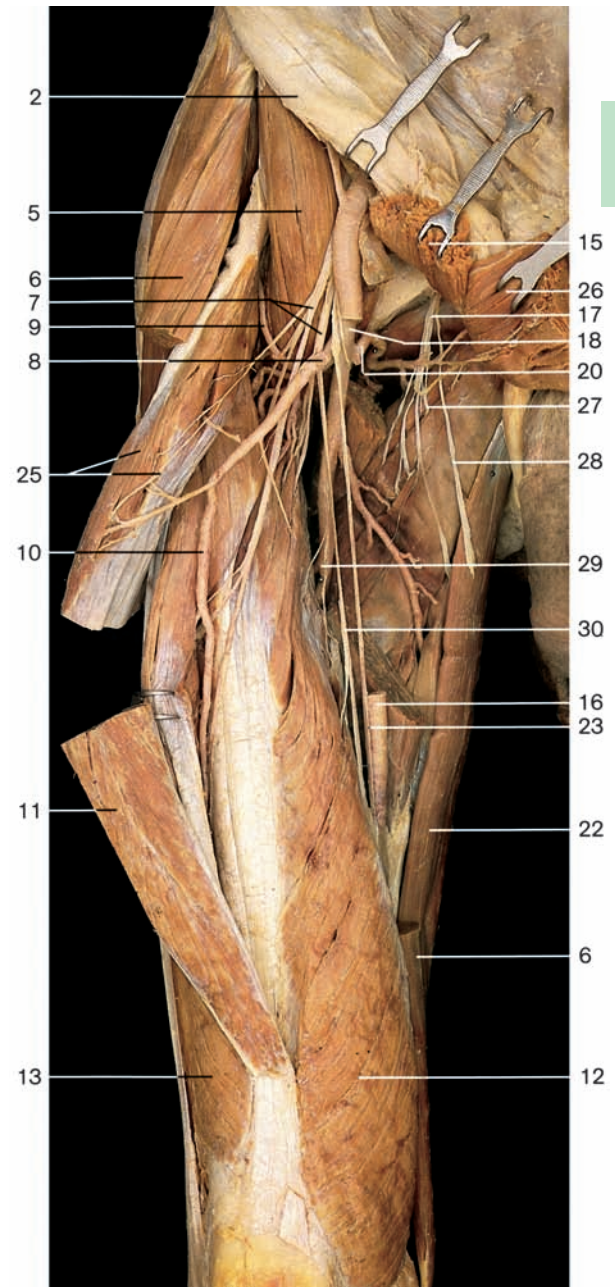
Anterior region of the thigh (right side, anterior aspect). The fascia lata has been removed and the sartorius muscle has been divided.

- 16 Pectineus muscle
- 17 Femoral vein
- 18 Great saphenous vein (divided)
- 19 Adductor longus muscle
- 20 Saphenous nerve
- 21 Muscular branch of femoral nerve
- 22 Gracilis muscle
- 23 Vastus medialis muscle
- 24 Ascending branch of lateral circumflex femoral artery
- 25 Descending branch of lateral circumflex femoral artery
- 26 Medial circumflex femoral artery
- 27 Adductor longus muscle
- 28 Penis
- 29 Entrance to adductor canal
- 30 Vasto-adductor membrane of fascia beneath sartorius muscle



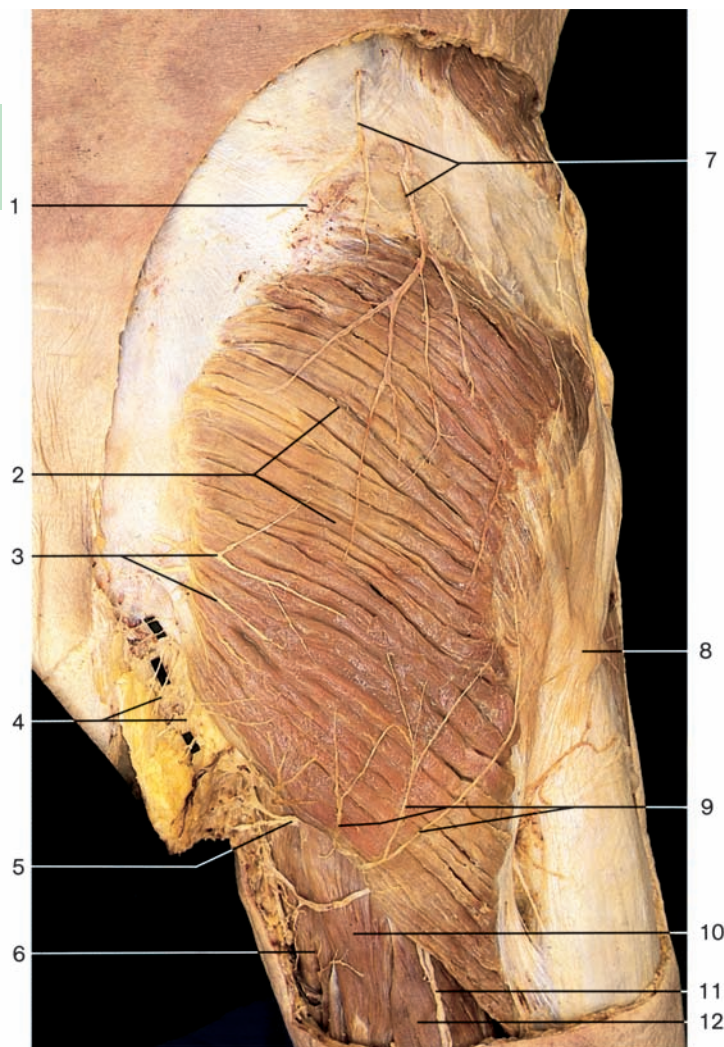
Anterior region of the thigh (right side, anterior aspect). The fascia lata has been removed. Sartorius and pectineus muscles, and the femoral artery have been cut to display the deep femoral artery with its branches. The rectus femoris muscle has been slightly reflected.

- 1 Anterior superior iliac spine
- 2 Inguinal ligament
- 3 Tensor fasciae latae muscle
- 4 Deep circumflex iliac artery
- 5 Iliopsoas muscle
- 6 Sartorius muscle (cut)
- 7 Femoral nerve
- 8 Lateral circumflex femoral artery
- 9 Ascending branch of lateral circumflex femoral artery
- 10 Descending branch of lateral circumflex femoral artery
- 11 Rectus femoris muscle
- 12 Vastus medialis muscle
- 13 Vastus lateralis muscle
- 14 Femoral vein
- 15 Pectineus muscle (cut)
- 16 Femoral artery (cut)

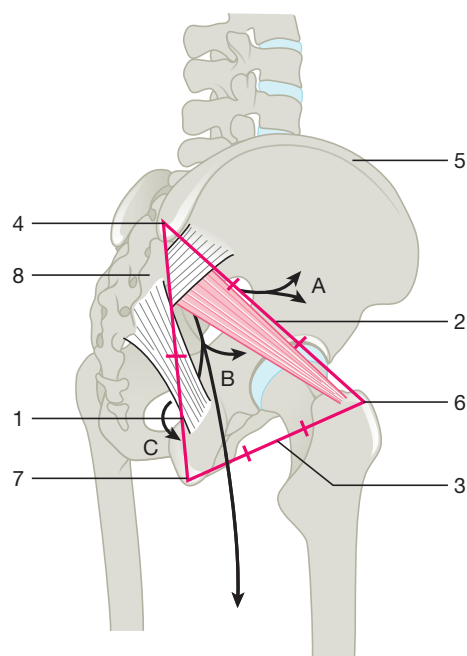


Anterior region of the thigh (right side, anterior aspect). The sartorius, pectineus, adductor longus, and rectus femoris muscles have been divided and reflected. The greater part of the femoral artery has been removed.

- 17 Obturator nerve
- 18 Deep artery of thigh
- 19 Ascending branch of medial circumflex femoral artery
- 20 Medial circumflex femoral artery
- 21 Adductor longus muscle
- 22 Gracilis muscle
- 23 Saphenous nerve
- 24 Distal part of vasto-adductor membrane
- 25 Rectus femoris muscle with muscular branches of femoral nerve
- 26 Adductor longus muscle (divided)
- 27 Posterior branch of obturator nerve
- 28 Anterior branch of obturator nerve
- 29 Point at which perforating artery branches off from deep artery of thigh
- 30 Muscular branch of femoral nerve to vastus medialis muscle



Gluteal region (right side). Dissection of the cutaneous nerves.



Location of the sciatic foramina in relation to the bones at the gluteal region (postero-lateral aspect).

- 1 Iliac crest
- 2 Gluteus maximus muscle
- 3 Middle cluneal nerves
- 4 Anococcygeal nerves
- 5 Perineal branch of posterior femoral cutaneous nerve
- 6 Adductor magnus muscle
- 7 Superior cluneal nerves
- 8 Position of greater trochanter
- 9 Inferior cluneal nerves
- 10 Semitendinosus muscle
- 11 Posterior femoral cutaneous nerve
- 12 Long head of biceps femoris muscle

A Suprapiriform foramen (of greater sciatic foramen)

Superior gluteal artery, vein, and nerve

B Infrapiriform foramen (of greater sciatic foramen)

Sciatic nerve
Inferior gluteal artery, vein, and nerve
Posterior femoral cutaneous nerve
Internal pudendal artery and vein
Pudendal nerve
Internal obturator nerve
Nerve to quadratus femoris muscle

C Lesser sciatic foramen

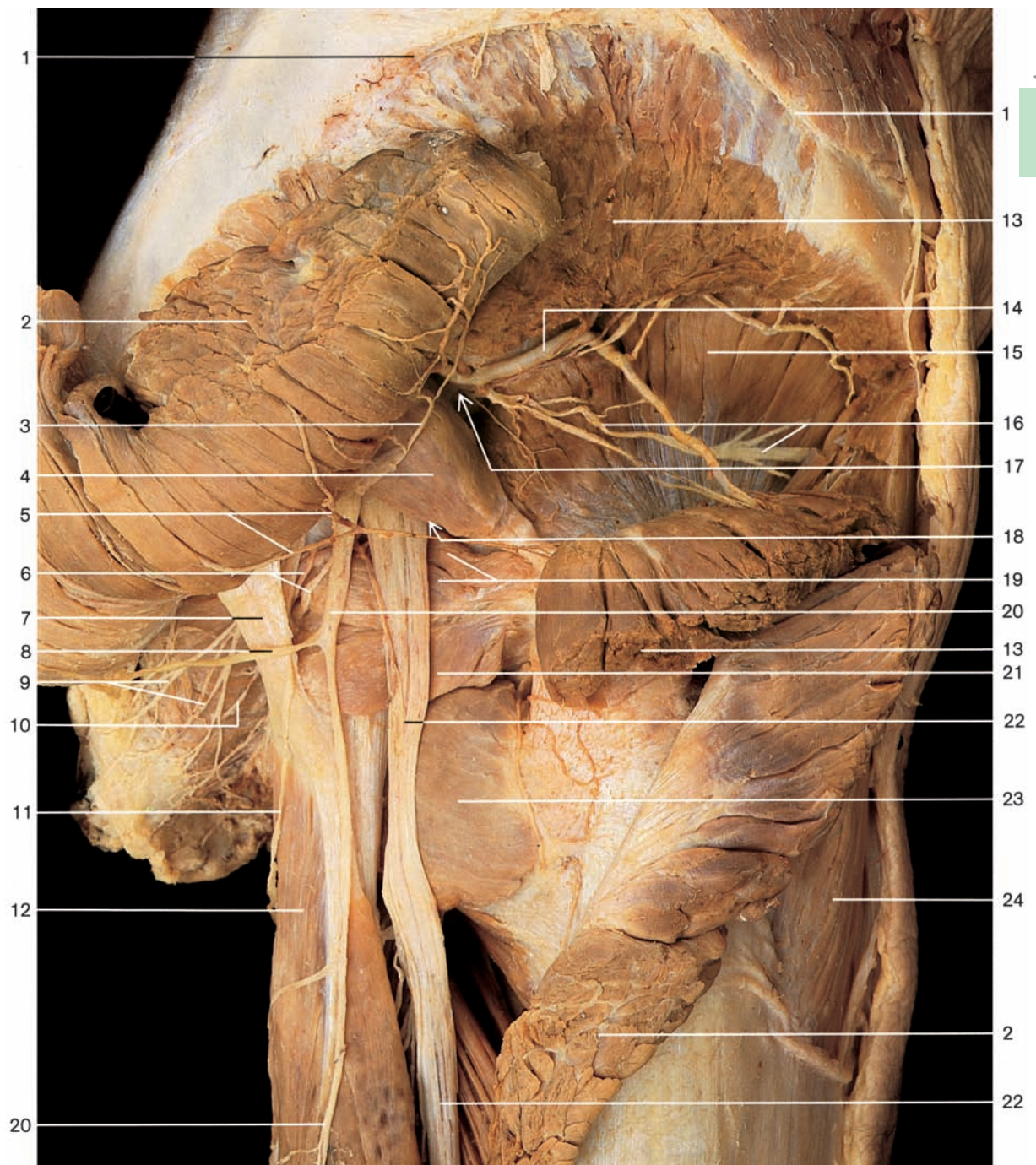
Pudendal nerve
Internal pudendal artery and vein
Internal obturator nerve

Red lines

- 1 **Spine-tuber line**
(the infrapiriform foramen is situated in the middle of this line)
- 2 **Spine-trochanter line**
(the suprapiriform foramen is located in the upper third)
- 3 **Tuber-trochanter line**
(the ischiadic nerve can be found between the middle and posterior third)

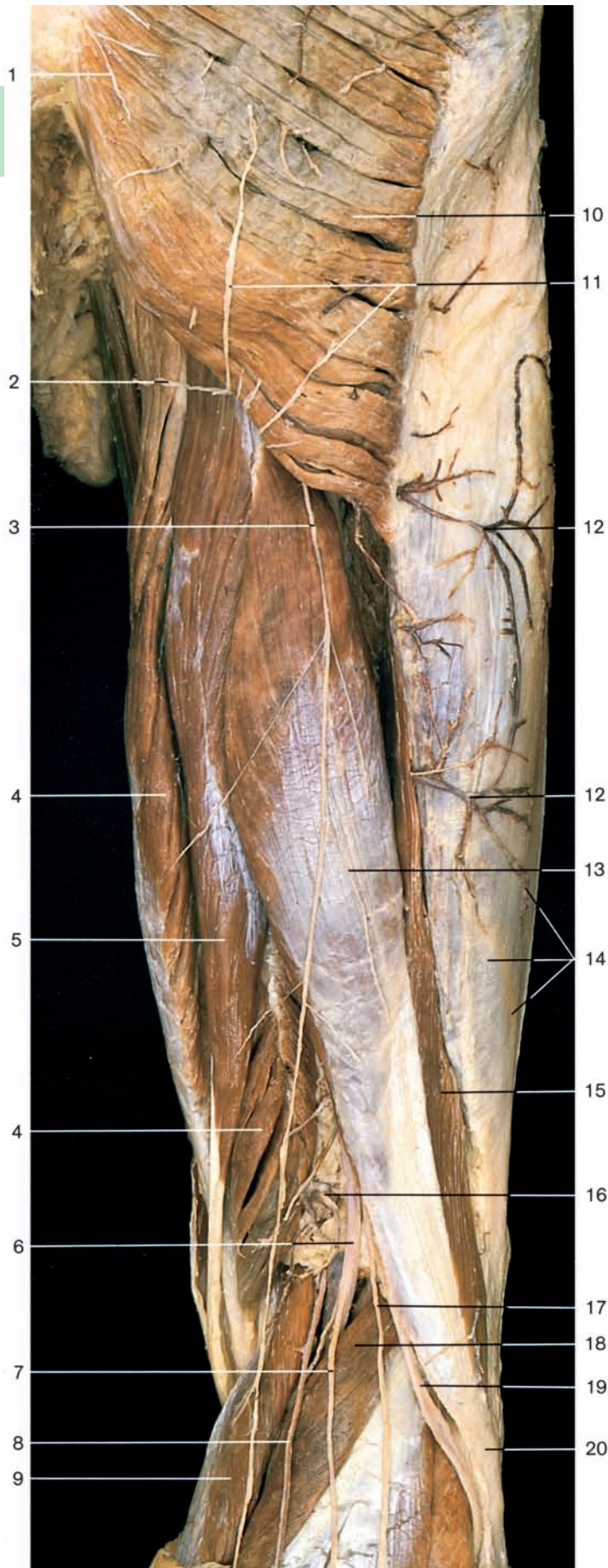
Other structures

- 4 Posterior superior iliac spine
- 5 Iliac crest
- 6 Greater trochanter
- 7 Ischial tuberosity
- 8 Sacrum



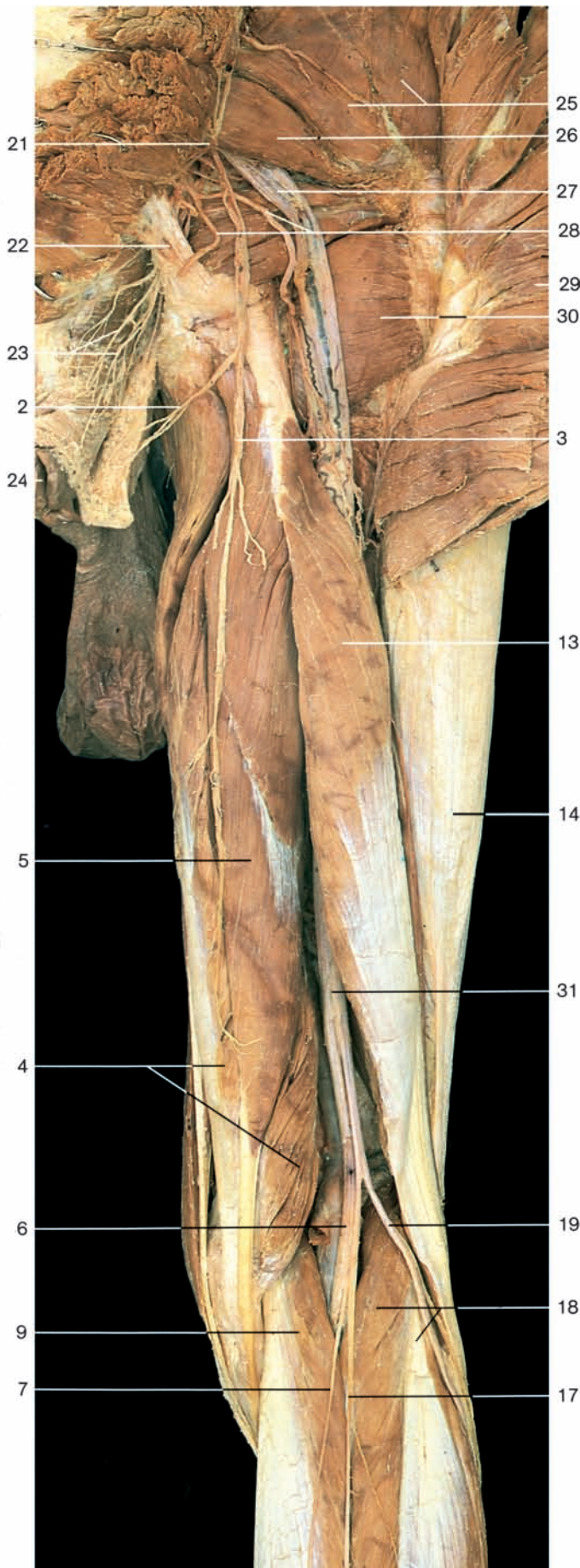
Gluteal region (right side). Gluteus maximus and gluteus medius muscles have been divided and reflected. Notice the position of the foramina above and below the piriformis muscle and the lesser sciatic foramen.

- | | |
|--|---|
| 1 Iliac crest | 12 Long head of biceps femoris muscle |
| 2 Gluteus maximus muscle (cut) | 13 Gluteus medius muscle (cut) |
| 3 Inferior gluteal nerve | 14 Deep branch of superior gluteal artery |
| 4 Piriformis muscle | 15 Gluteus minimus muscle |
| 5 Muscular branches of inferior gluteal artery | 16 Superior gluteal nerve |
| 6 Pudendal nerve and internal pudendal artery within the lesser sciatic foramen (entrance to the pudendal canal) | 17 Suprapiriform foramen } greater sciatic foramen |
| 7 Sacrotuberous ligament | 18 Infrapiriform foramen } |
| 8 Inferior cluneal nerve | 19 Obturator internus and superior gemellus muscles |
| 9 Inferior rectal nerves | 20 Posterior femoral cutaneous nerve |
| 10 Inferior rectal arteries | 21 Inferior gemellus muscle |
| 11 Perforating cutaneous nerve of posterior femoral cutaneous nerve | 22 Sciatic nerve |
| | 23 Quadratus femoris muscle |
| | 24 Tensor fasciae latae muscle |

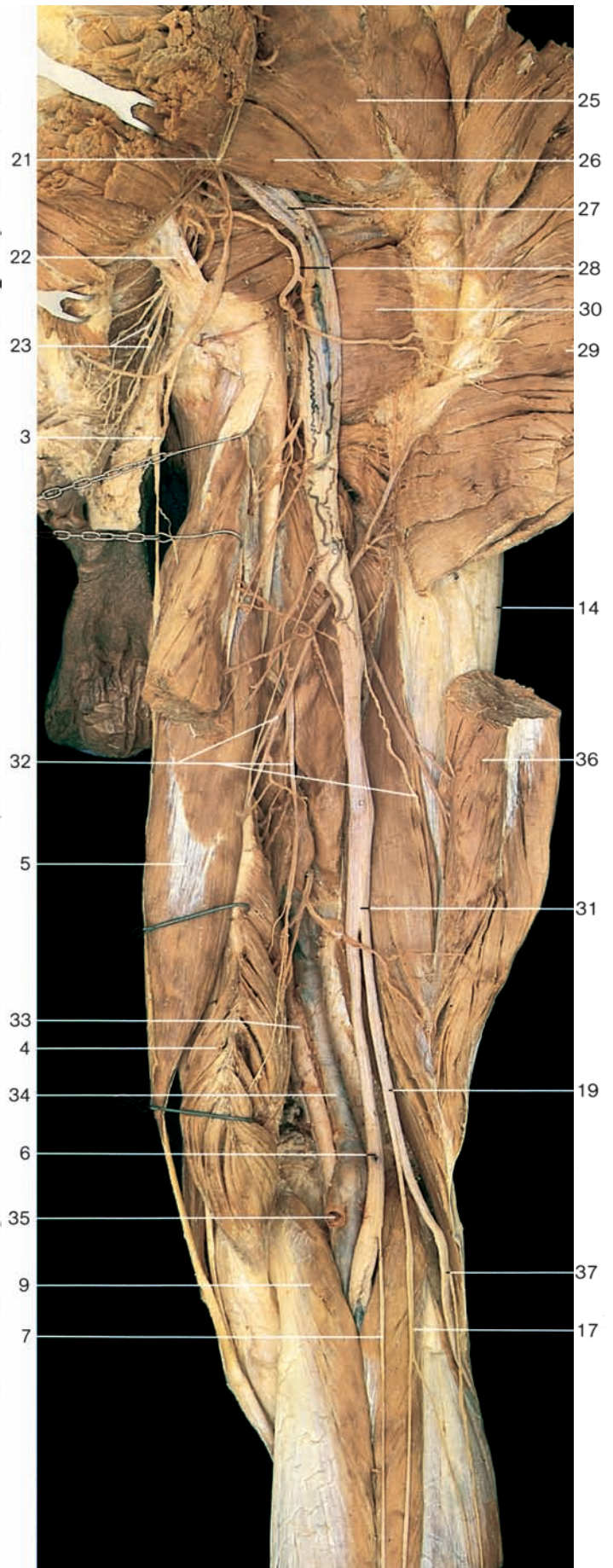


- 1 Middle cluneal nerves
- 2 Perineal branch of posterior femoral cutaneous nerve
- 3 Posterior femoral cutaneous nerve
- 4 Semimembranosus muscle
- 5 Semitendinosus muscle
- 6 Tibial nerve
- 7 Medial sural cutaneous nerve
- 8 Small saphenous vein
- 9 Medial head of gastrocnemius muscle
- 10 Gluteus maximus muscle
- 11 Inferior cluneal nerves
- 12 Cutaneous veins
- 13 Long head of biceps femoris muscle
- 14 Iliotibial tract
- 15 Short head of biceps femoris muscle
- 16 Popliteal fossa
- 17 Lateral sural cutaneous nerve
- 18 Lateral head of gastrocnemius muscle
- 19 Common fibular nerve
- 20 Tendon of biceps femoris muscle
- 21 Inferior gluteal nerve
- 22 Sacrotuberous ligament
- 23 Inferior rectal branches of pudendal nerve
- 24 Anus
- 25 Gluteus medius muscle
- 26 Piriformis muscle
- 27 Sciatic nerve
- 28 Inferior gluteal artery
- 29 Gluteus maximus muscle (cut)
- 30 Quadratus femoris muscle
- 31 Sciatic nerve dividing into its two branches (the common fibular nerve and the tibial nerve)
- 32 Muscular branches of sciatic nerve to the ischiocrural muscles
- 33 Popliteal artery
- 34 Popliteal vein
- 35 Small saphenous vein (cut)
- 36 Long head of biceps femoris muscle (cut)
- 37 Superficial fibular nerve

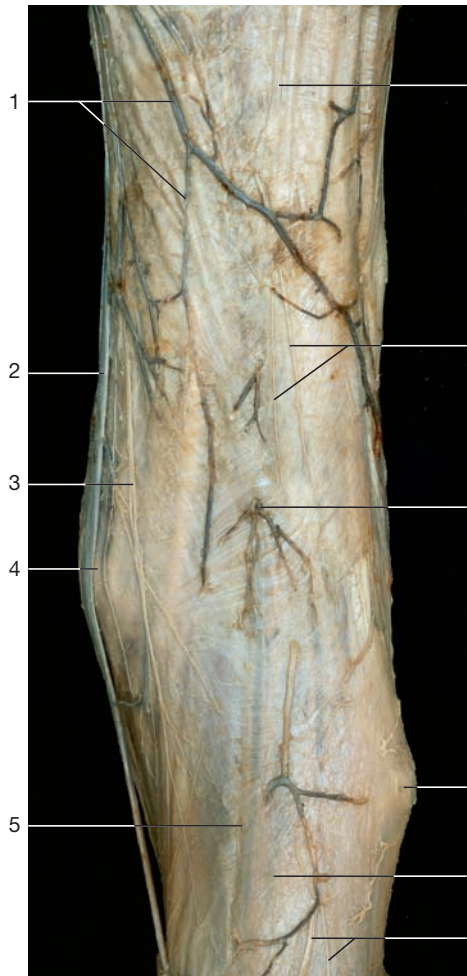
Gluteal and posterior regions of the thigh with cutaneous nerves (right side). The fascia lata and the fasciae of the muscles have been removed.



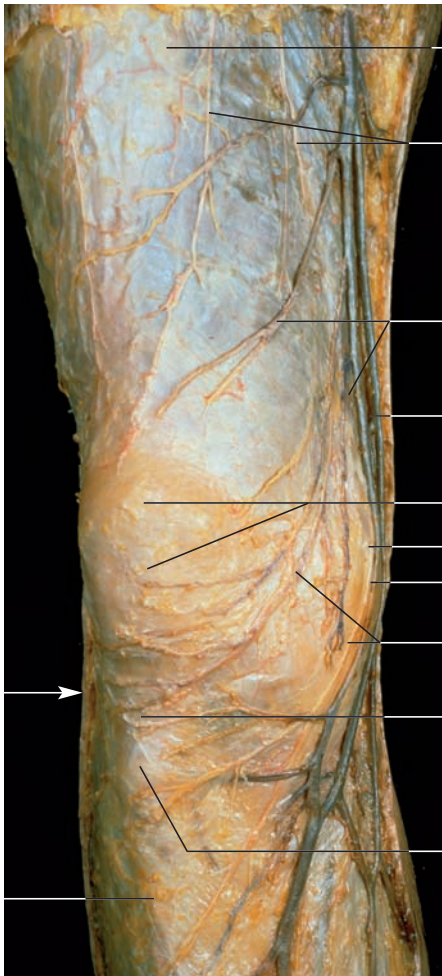
Gluteal and posterior regions of the thigh (right side). The gluteus maximus muscle has been divided and reflected.



Gluteal and posterior regions of the thigh (right side). The gluteus maximus muscle and the long head of the biceps femoris muscle have been divided and reflected.



Posterior region of the knee with cutaneous nerves and veins (right side).

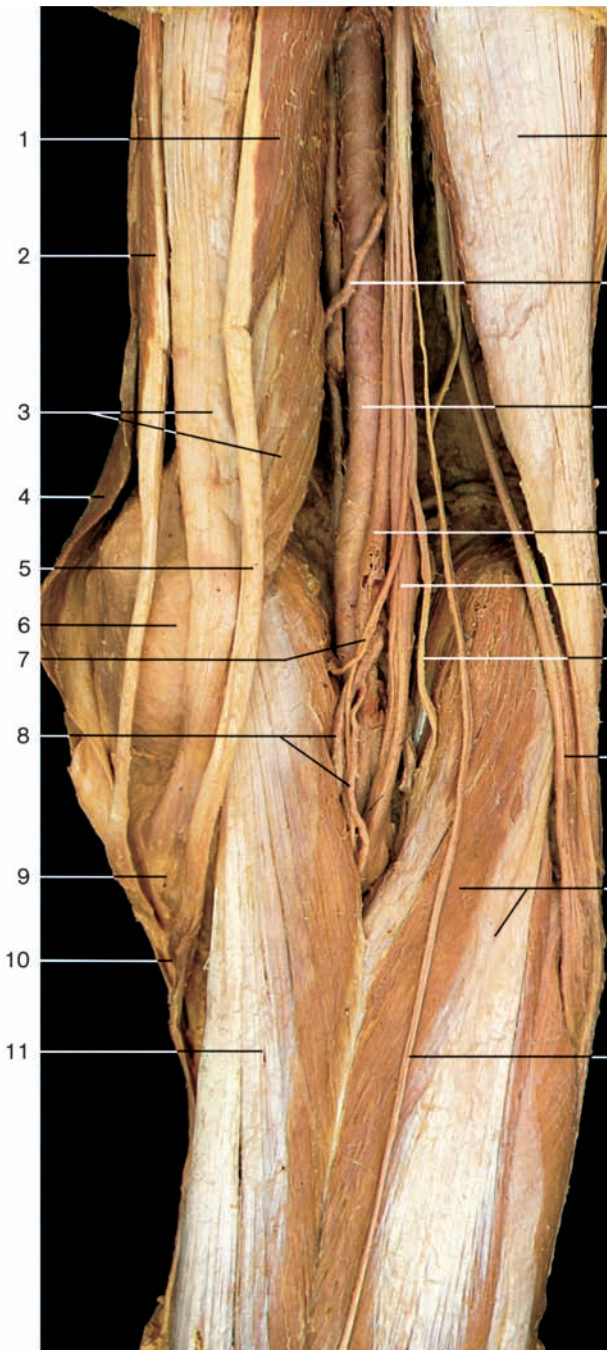


Anterior region of the knee with cutaneous nerves and veins (right side).

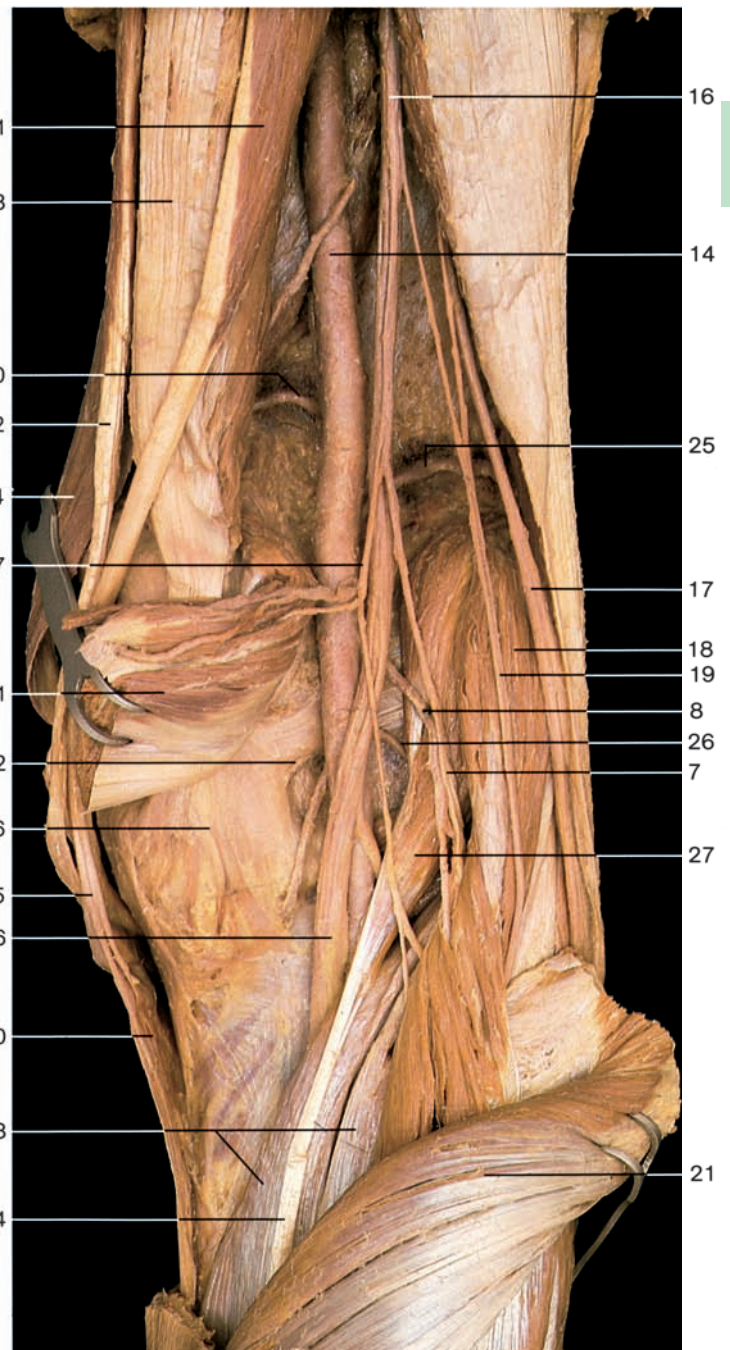
- 1 Cutaneous veins (tributaries of great saphenous vein)
- 2 Great saphenous vein
- 3 Cutaneous branches of femoral nerve
- 4 Position of medial condyle of femur
- 5 Position of small saphenous vein
- 6 Fascia lata
- 7 Terminal branches of posterior femoral cutaneous nerve
- 8 Cutaneous veins of popliteal fossa
- 9 Position of head of fibula
- 10 Superficial layer of fascia cruris
- 11 Lateral sural cutaneous nerve
- 12 Venous network around knee
- 13 Patella
- 14 Saphenous nerve
- 15 Infrapatellar branch of saphenous nerve
- 16 Patellar ligament
- 17 Position of tibial tuberosity
- 18 Sartorius muscle
- 19 Semimembranosus muscle
- 20 Gastrocnemius muscle
- 21 Popliteal vein
- 22 Tibial nerve
- 23 Biceps femoris muscle
- 24 Popliteal artery
- 25 Lateral inferior genicular artery
- 26 Fibula



Coronal section through the popliteal fossa (MRI scan).
(From Heuck et al., MRT-Atlas, 2009.)



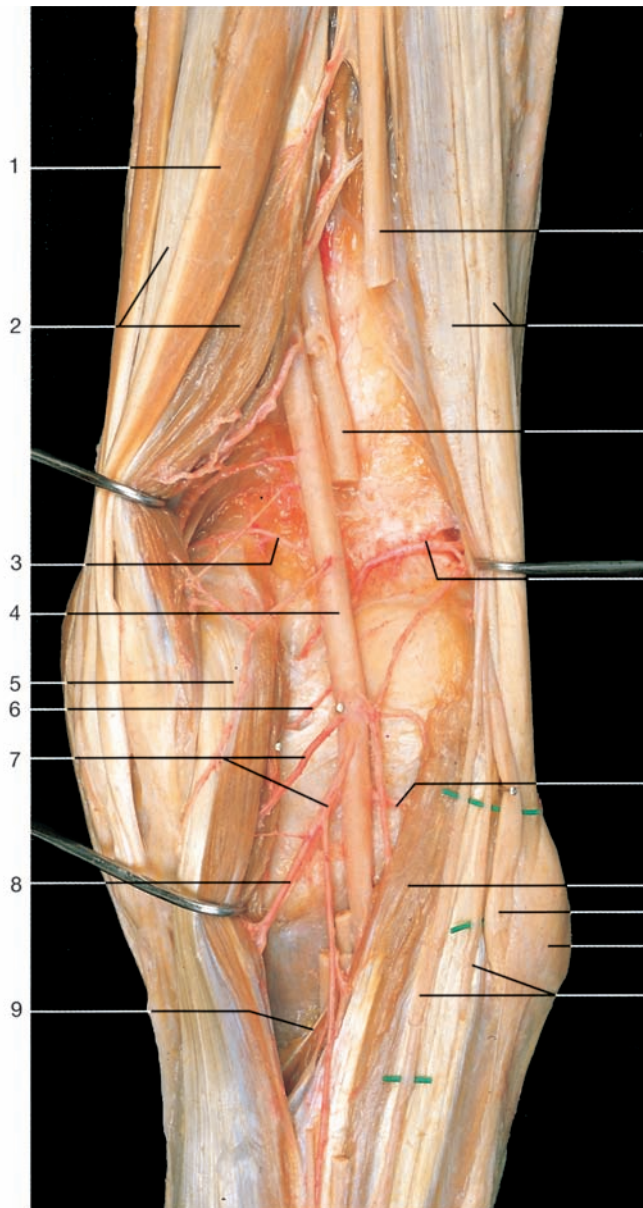
Popliteal fossa, middle layer (right side). The gastrocnemius muscle has been divided and reflected.



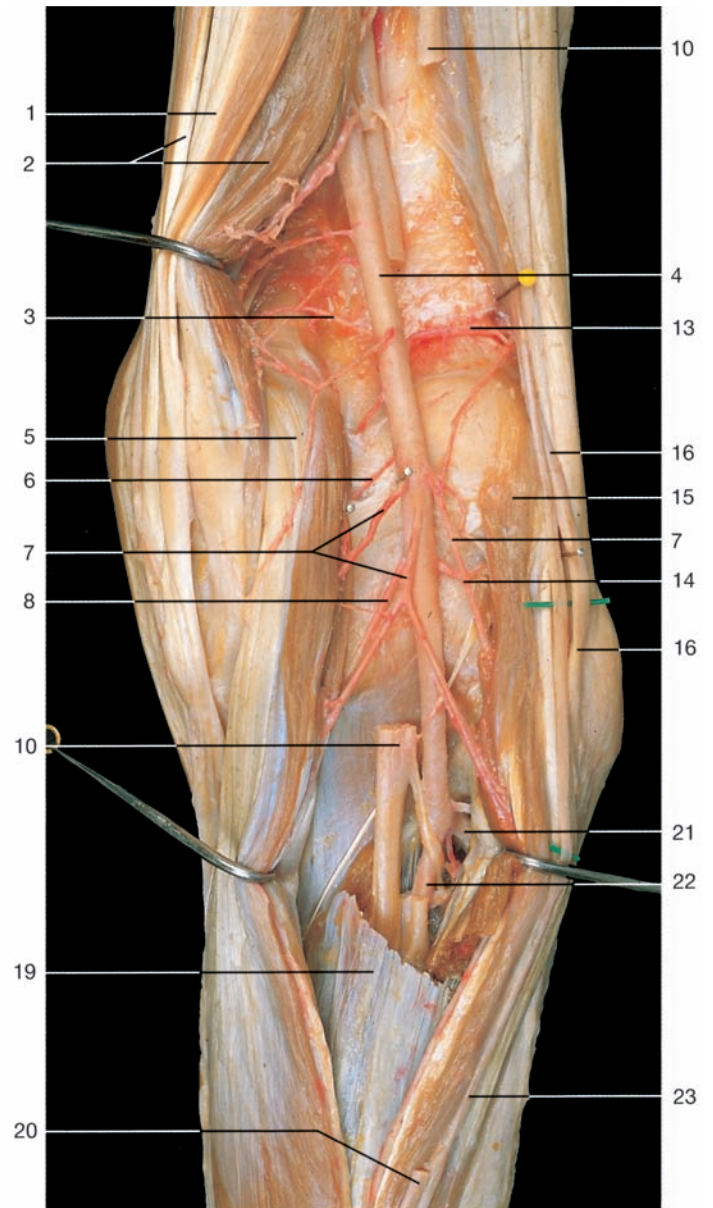
Popliteal fossa, deep layer (right side). Gastrocnemius and soleus muscles have been divided and reflected.

- 1 Semitendinosus muscle
- 2 Gracilis muscle
- 3 Semimembranosus muscle
- 4 Sartorius muscle
- 5 Tendon of semitendinosus muscle
- 6 Position of medial condyle of femur
- 7 Muscular branches of tibial nerve
- 8 Sural arteries and veins
- 9 Tendon of semimembranosus muscle
- 10 Common tendon of gracilis, semitendinosus, and sartorius muscles (pes anserinus)
- 11 Medial head of gastrocnemius muscle
- 12 Biceps femoris muscle
- 13 Muscular branch of popliteal artery

- 14 Popliteal artery
- 15 Popliteal vein
- 16 Tibial nerve
- 17 Common fibular nerve
- 18 Lateral head of gastrocnemius muscle
- 19 Medial sural cutaneous nerve
- 20 Medial superior genicular artery
- 21 Medial head of gastrocnemius muscle (cut and reflected)
- 22 Medial inferior genicular artery
- 23 Soleus muscle
- 24 Tendon of plantaris muscle
- 25 Lateral superior genicular artery
- 26 Lateral inferior genicular artery
- 27 Plantaris muscle



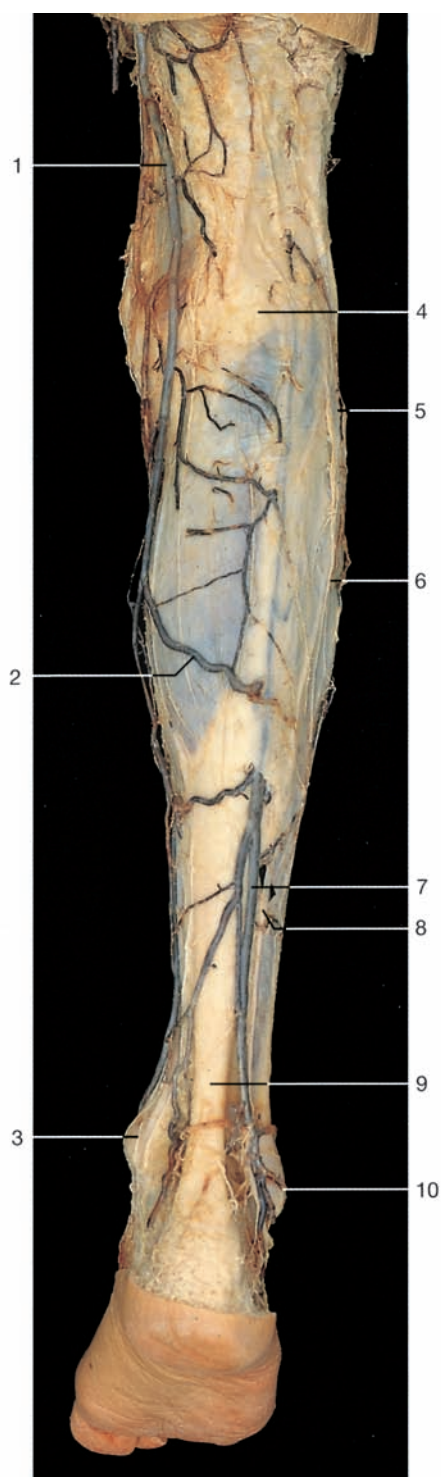
Popliteal fossa, deep layer (right side). The muscles have been reflected to display the genicular arteries.



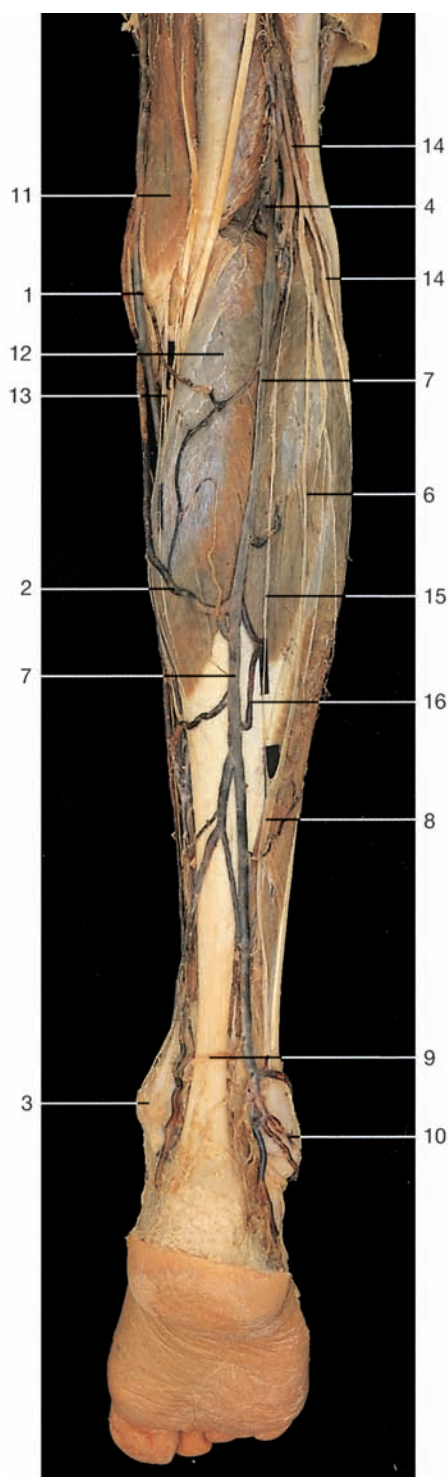
Popliteal fossa, deepest layer (right side). Tibial nerve and popliteal vein have been partly removed and a portion of the soleus muscle was cut away to display the anterior tibial artery.

- 1 Semitendinosus muscle
- 2 Semimembranosus muscle
- 3 Medial superior genicular artery
- 4 Popliteal artery
- 5 Medial head of gastrocnemius muscle
- 6 Middle genicular artery
- 7 Muscular branches of popliteal artery
- 8 Medial inferior genicular artery
- 9 Tendon of plantaris muscle
- 10 Tibial nerve (cut)
- 11 Biceps femoris muscle
- 12 Popliteal vein (cut)

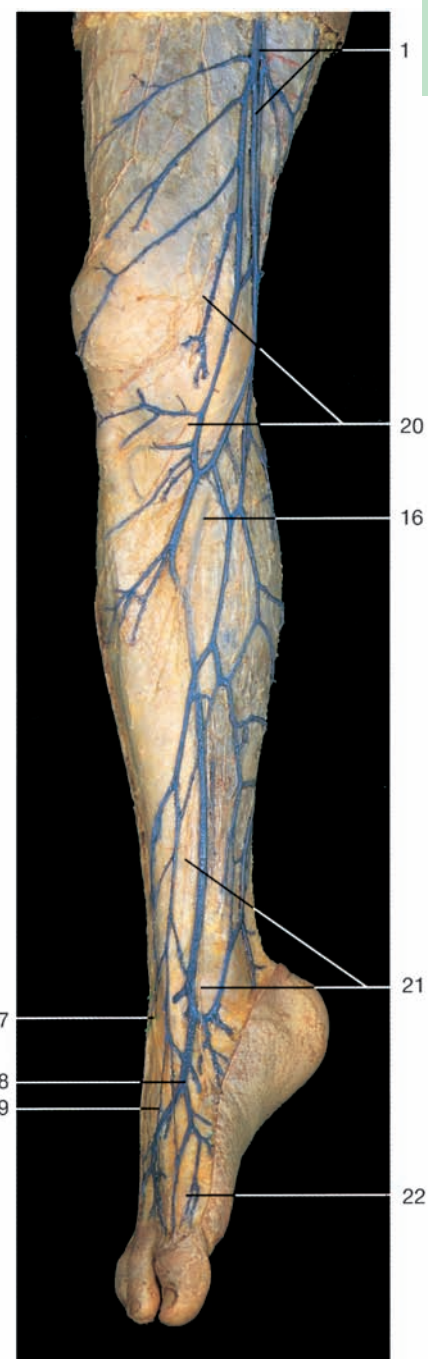
- 13 Lateral superior genicular artery
- 14 Lateral inferior genicular artery
- 15 Lateral head of gastrocnemius muscle
- 16 Common fibular nerve
- 17 Head of fibula
- 18 Lateral sural cutaneous nerves
- 19 Soleus muscle
- 20 Medial sural cutaneous nerve
- 21 Anterior tibial artery
- 22 Posterior tibial artery
- 23 Lateral sural cutaneous nerve



Posterior crural region and popliteal fossa with cutaneous veins and nerves (right side).



Posterior crural region and popliteal fossa with cutaneous veins and nerves (right side). The superficial layer of the crural fascia has been removed.

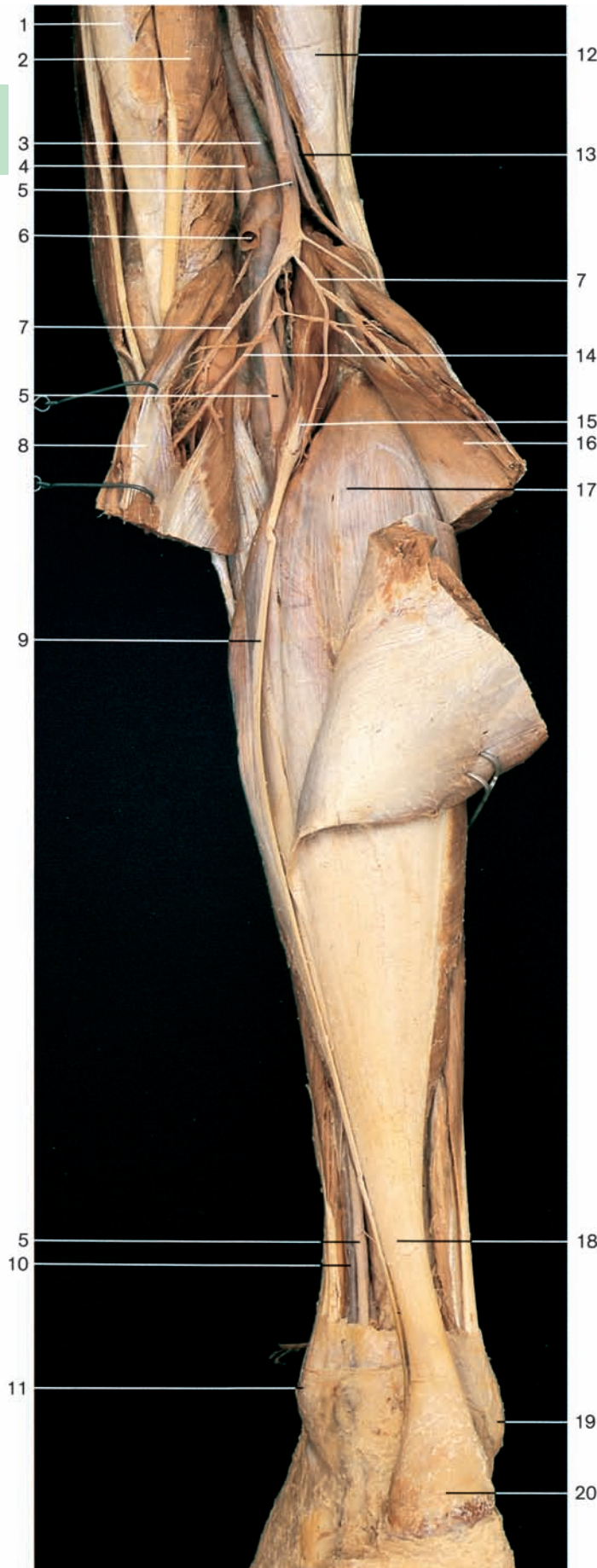


Antero-medial crural region with cutaneous veins and nerves (right side).

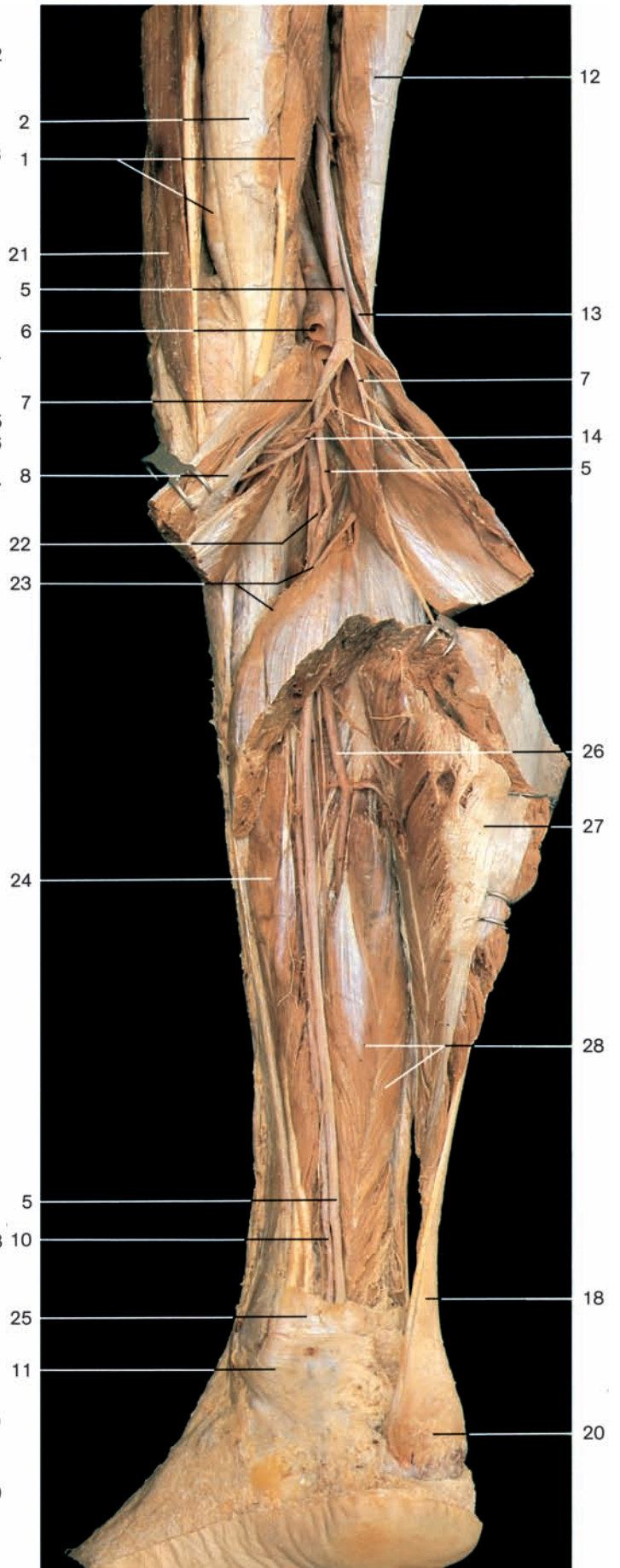
- 1 Great saphenous vein
- 2 Anastomosis between small and great saphenous veins
- 3 Medial malleolus
- 4 Popliteal fossa
- 5 Position of head of fibula
- 6 Lateral sural cutaneous nerve
- 7 Small saphenous vein

- 8 Sural nerve
- 9 Calcaneal or Achilles tendon
- 10 Lateral malleolus
- 11 Semitendinosus muscle
- 12 Medial head of gastrocnemius muscle
- 13 Saphenous nerve
- 14 Common fibular nerve
- 15 Medial sural cutaneous nerve

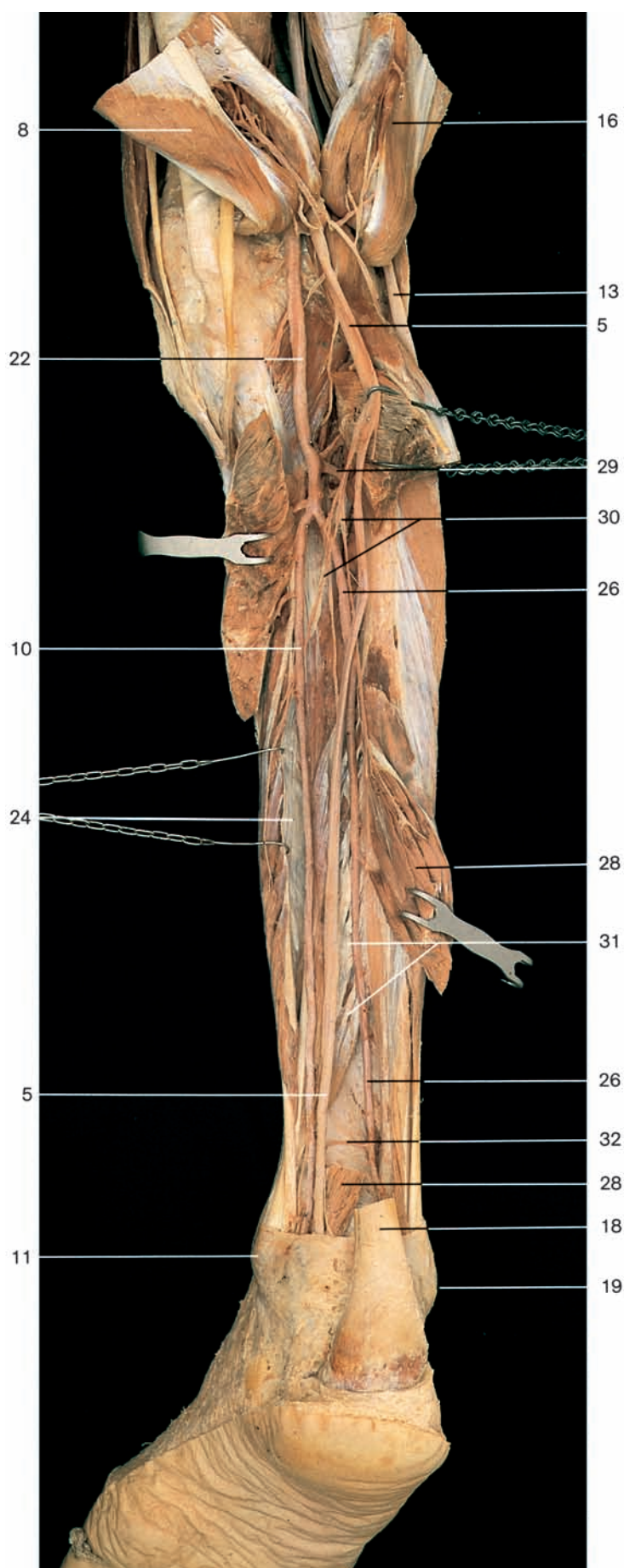
- 16 Perforating veins
- 17 Superficial fibular nerve
- 18 Dorsal venous arch of foot
- 19 Intermediate dorsal cutaneous nerve
- 20 Infrapatellar branches of saphenous nerve
- 21 Terminal branches of saphenous nerve
- 22 Medial dorsal cutaneous nerve



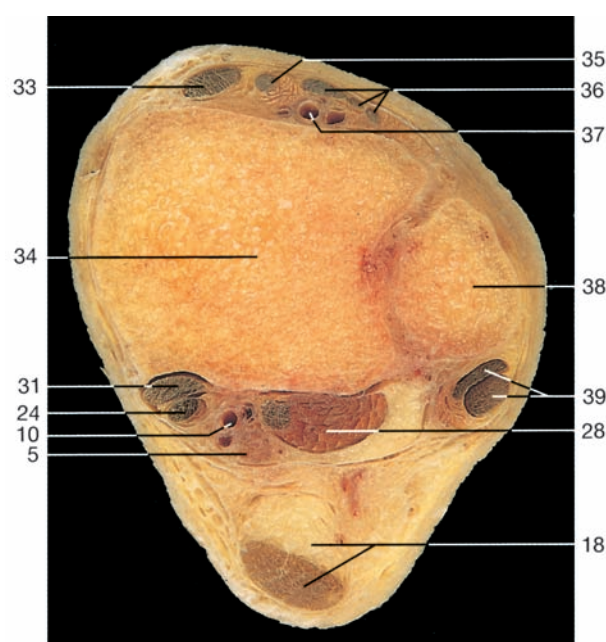
Posterior crural region and popliteal fossa, superficial layer (right side). The cutaneous veins and nerves have been removed.



Posterior crural region and popliteal fossa, middle layer (right side). The medial head of gastrocnemius muscle has been divided and reflected.



- 1 Semimembranosus muscle
- 2 Semitendinosus muscle
- 3 Popliteal vein
- 4 Popliteal artery
- 5 Tibial nerve
- 6 Small saphenous vein (cut)
- 7 Muscular branch of tibial nerve
- 8 Medial head of gastrocnemius muscle
- 9 Tendon of plantaris muscle
- 10 Posterior tibial artery
- 11 Medial malleolus
- 12 Biceps femoris muscle
- 13 Common fibular nerve
- 14 Sural arteries
- 15 Plantaris muscle
- 16 Lateral head of gastrocnemius muscle
- 17 Soleus muscle
- 18 Calcaneal or Achilles tendon
- 19 Lateral malleolus
- 20 Calcaneal tuberosity
- 21 Sartorius muscle
- 22 Popliteal artery
- 23 Tendinous arch of soleus muscle
- 24 Flexor digitorum longus muscle
- 25 Flexor retinaculum
- 26 Peroneal artery
- 27 Triceps surae muscle (cut)
- 28 Flexor hallucis longus muscle
- 29 Anterior tibial artery
- 30 Muscular branches of tibial nerve
- 31 Tibialis posterior muscle
- 32 Communicating branch of peroneal artery
- 33 Tendon of tibialis anterior muscle
- 34 Tibia
- 35 Tendon of extensor hallucis longus muscle
- 36 Tendons of extensor digitorum longus muscle
- 37 Anterior tibial artery
- 38 Fibula
- 39 Tendons of peroneus longus and brevis muscles



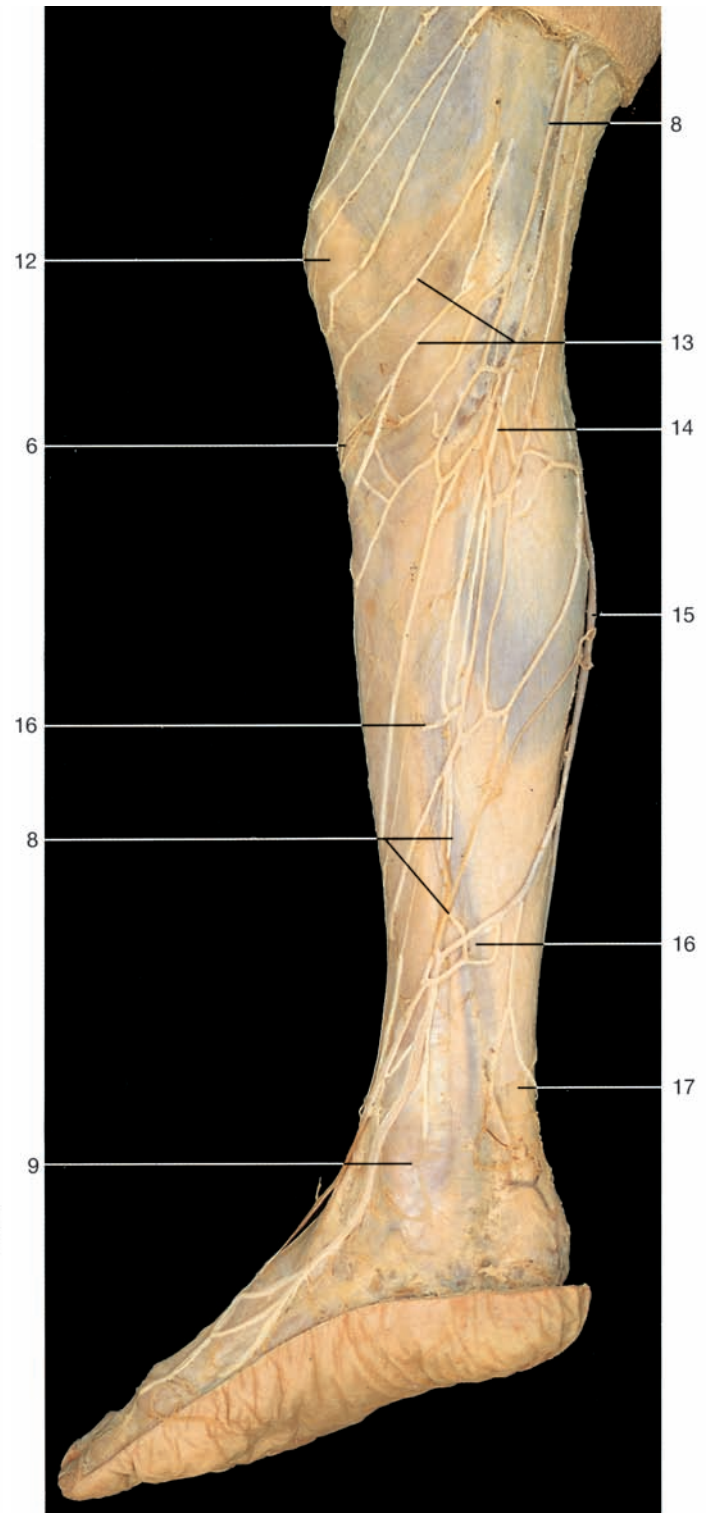
Cross section through the leg, superior to the malleoli (inferior aspect).

Posterior crural region and popliteal fossa, deep layer (right side). Triceps surae (gastrocnemius and soleus) and flexor hallucis longus muscles have been cut and reflected.



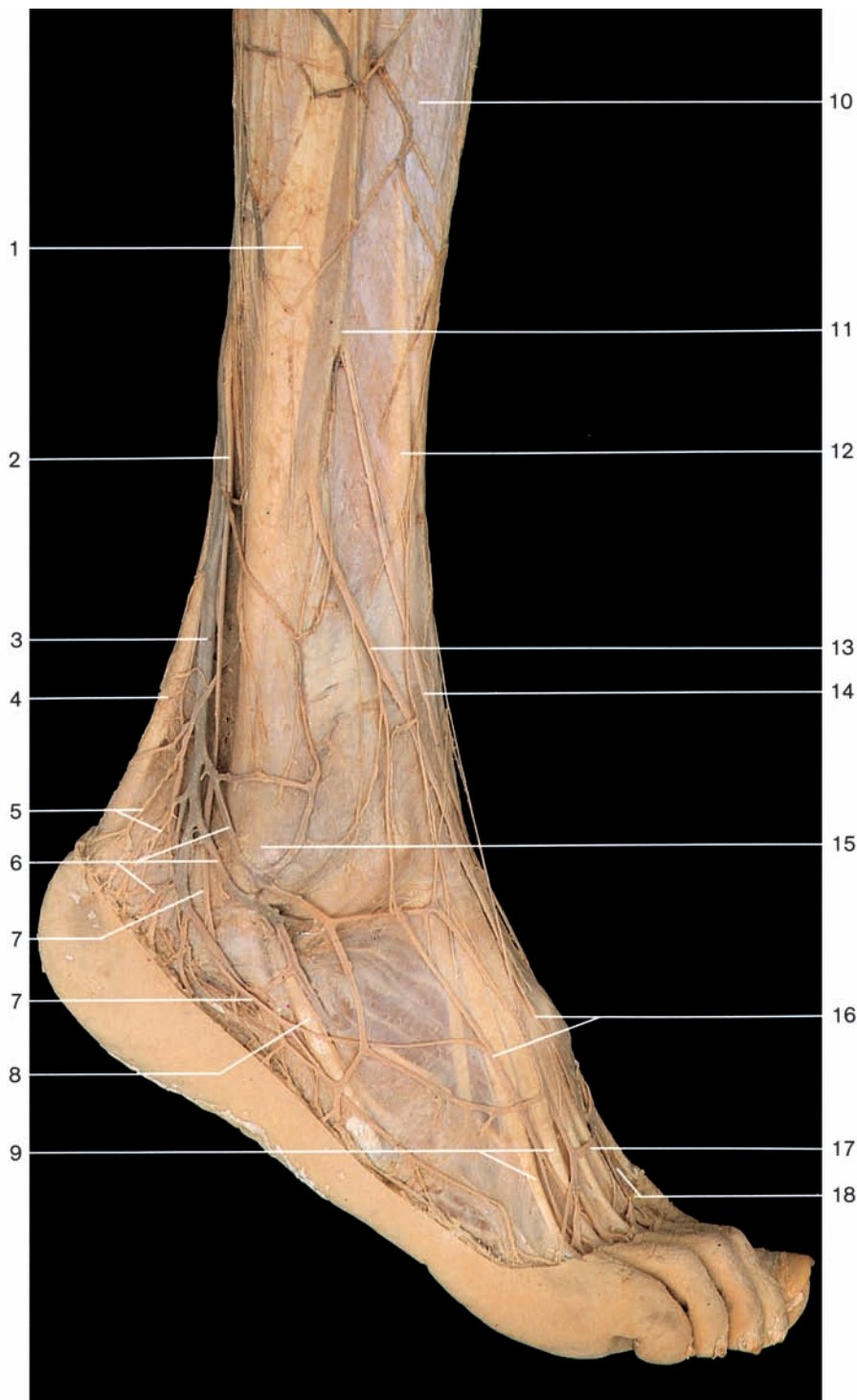
Anterior crural region and dorsum of the foot with cutaneous nerves and veins (right side).

- 1 Superficial crural fascia
- 2 Medial dorsal cutaneous branch of superficial fibular nerve
- 3 Lateral malleolus
- 4 Intermediate dorsal cutaneous branch of superficial fibular nerve
- 5 Lateral dorsal cutaneous branch of sural nerve
- 6 Position of tibial tuberosity
- 7 Anterior margin of tibia
- 8 Great saphenous vein
- 9 Medial malleolus



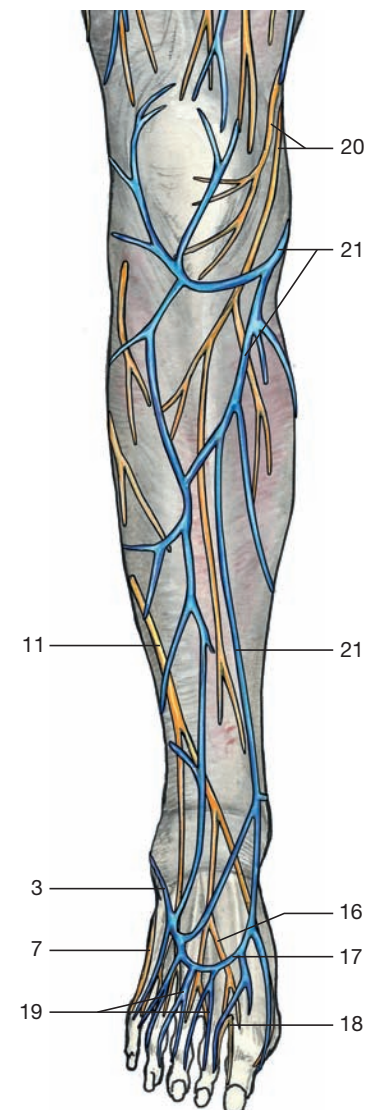
Medial crural region and foot with cutaneous nerves and veins (right side).

- 10 Deep fibular nerve
- 11 Dorsal venous arch of foot
- 12 Position of patella
- 13 Infrapatellar branches of saphenous nerve
- 14 Saphenous nerve
- 15 Small saphenous vein
- 16 Perforating vein
- 17 Calcaneal or Achilles tendon



Lateral crural region and foot with cutaneous nerves and veins (right side).

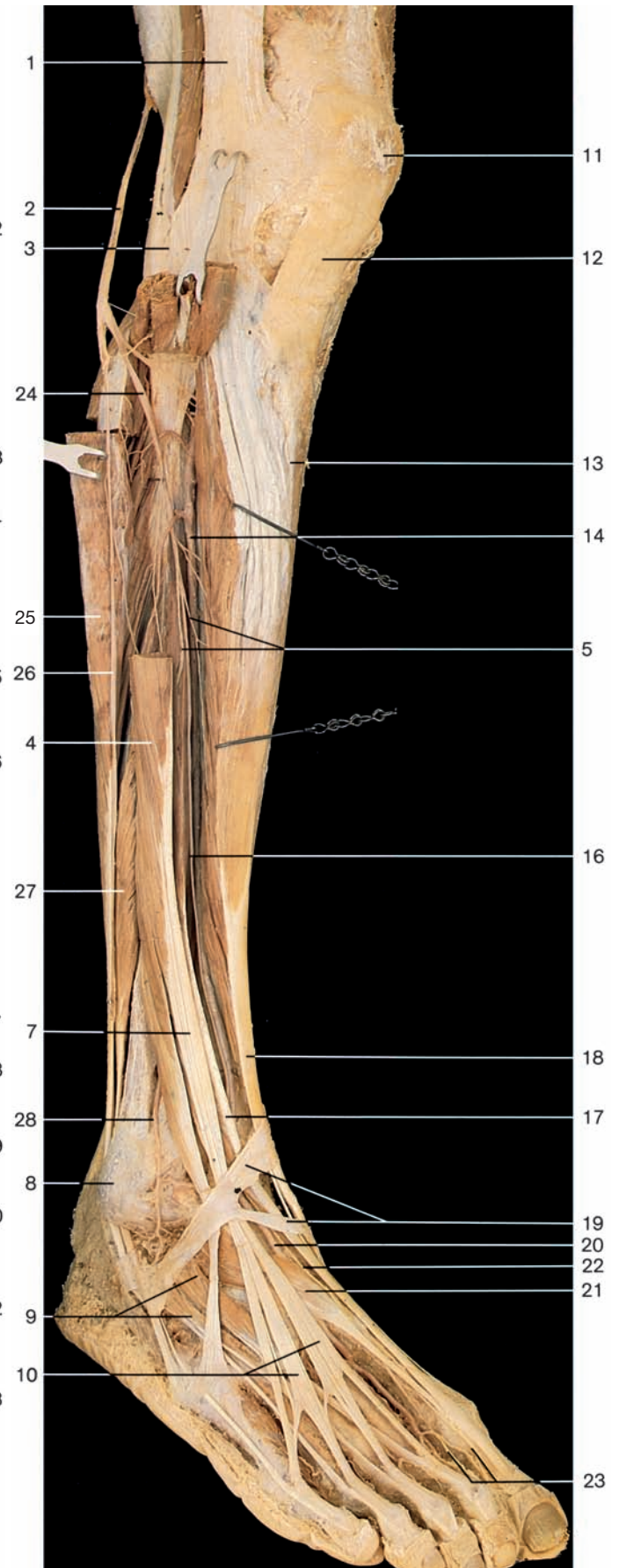
- | | |
|--|--|
| 1 Position of fibula | 11 Superficial fibular nerve |
| 2 Sural nerve | 12 Position of tibia |
| 3 Small saphenous vein | 13 Intermediate dorsal cutaneous branch of superficial fibular nerve |
| 4 Calcaneal or Achilles tendon | 14 Medial dorsal cutaneous branch of superficial fibular nerve |
| 5 Lateral calcaneal branches of sural nerve | 15 Lateral malleolus |
| 6 Venous plexus of lateral malleolus | 16 Dorsal digital nerves |
| 7 Lateral dorsal cutaneous branch of sural nerve | 17 Dorsal venous arch of foot |
| 8 Tendon of peroneus brevis muscle | 18 Deep fibular nerve |
| 9 Tendons of extensor digitorum longus muscle | 19 Dorsal metatarsal veins |
| 10 Crural fascia | 20 Saphenous nerve |
| | 21 Great saphenous vein |



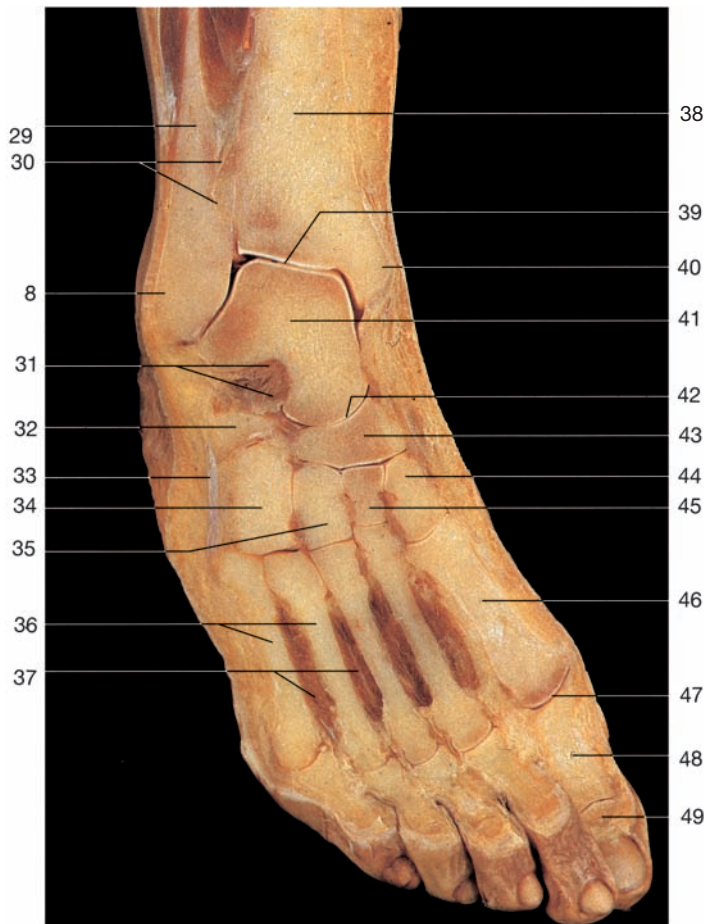
Anterior crural region and dorsum of the foot with cutaneous nerves and veins.



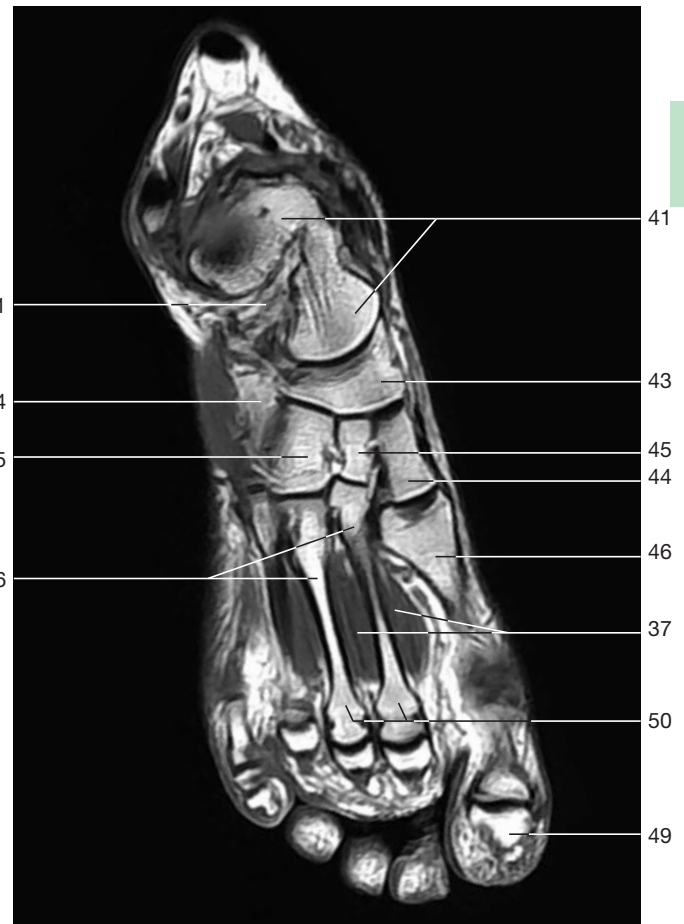
Anterior crural region and dorsum of the foot, middle layer (right side, antero-lateral aspect). The extensor digitorum longus muscle has been divided and reflected laterally.



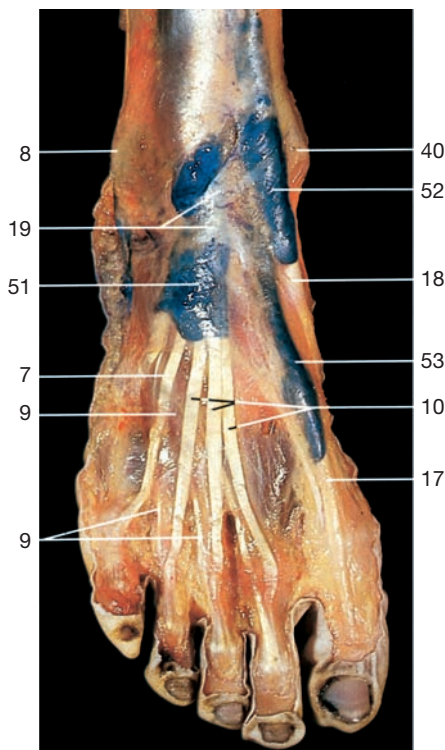
Anterior crural region and dorsum of the foot, deep layer (right side, antero-lateral aspect). Extensor digitorum longus and peroneus longus muscles have been divided or removed. The common fibular nerve has been elevated to show its course around the head of fibula.



Coronal section through the right foot and ankle joint (dorsal aspect).

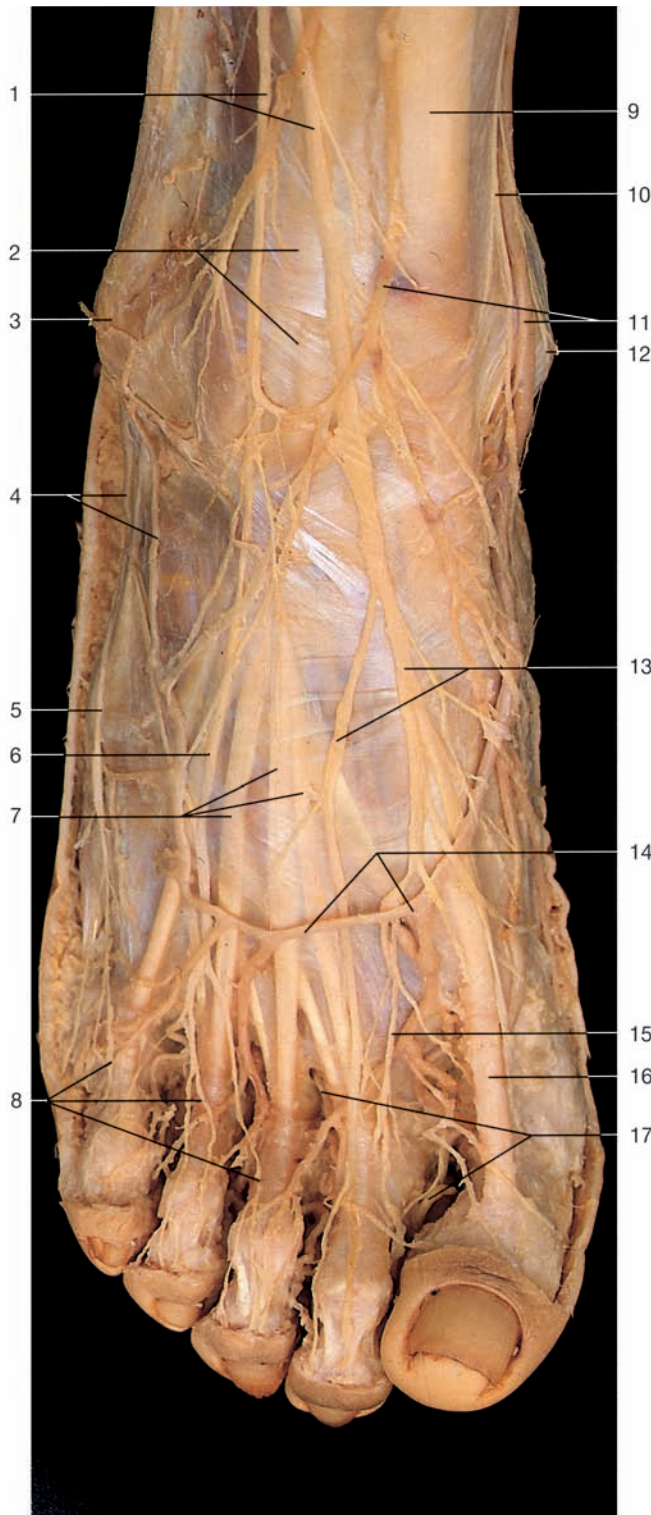


Coronal section through the right foot and ankle joint (MRI scan). (From Heuck et al., MRT-Atlas, 2009.)

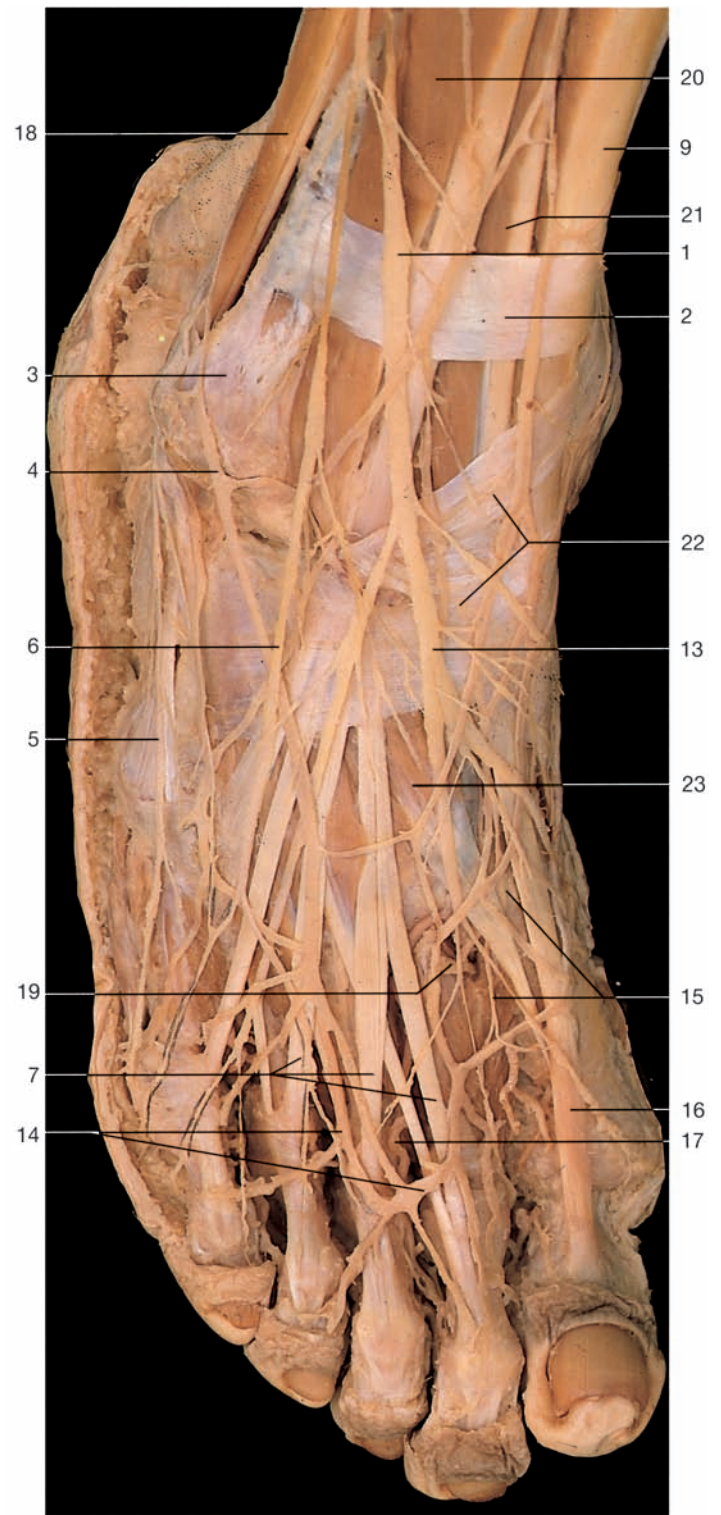


Synovial sheaths of extensor tendons (dorsal aspect). The sheaths have been injected with blue gelatin.

- | | |
|--|---|
| 1 Iliotibial tract | 29 Fibula |
| 2 Common fibular nerve | 30 Distal tibiofibular joint (syndesmosis) |
| 3 Position of head of fibula | 31 Talocalcaneal interosseous ligament |
| 4 Extensor digitorum longus muscle | 32 Calcaneus |
| 5 Muscular branches of deep fibular nerve | 33 Tendon of peroneus brevis muscle |
| 6 Superficial fibular nerve | 34 Cuboid bone |
| 7 Tendon of extensor digitorum longus muscle | 35 Lateral cuneiform bone |
| 8 Lateral malleolus | 36 Metatarsal bones |
| 9 Extensor digitorum brevis muscle with tendons | 37 Dorsal interossei muscles |
| 10 Tendons of extensor digitorum longus muscle | 38 Tibia |
| 11 Patella | 39 Ankle joint |
| 12 Patellar ligament | 40 Medial malleolus |
| 13 Anterior margin of tibia | 41 Talus |
| 14 Anterior tibial artery | 42 Talocalcaneonavicular joint |
| 15 Tibialis anterior muscle | 43 Navicular bone |
| 16 Deep fibular nerve | 44 Medial cuneiform bone |
| 17 Extensor hallucis longus muscle | 45 Intermediate cuneiform bone |
| 18 Tendon of tibialis anterior muscle | 46 First metatarsal bone |
| 19 Inferior extensor retinaculum | 47 Metatarsophalangeal joint of great toe |
| 20 Dorsalis pedis artery | 48 Proximal phalanx of great toe |
| 21 Extensor hallucis brevis muscle | 49 Distal phalanx of great toe |
| 22 Deep fibular nerve (on dorsum of foot) | 50 Heads of the second and third metatarsal bones |
| 23 Terminal branches of deep fibular nerve | 51 Synovial sheath of tendons of extensor digitorum longus muscle |
| 24 Deep fibular nerve | 52 Synovial sheath of tendon of tibialis anterior muscle |
| 25 Peroneus longus muscle (cut) | 53 Synovial sheath of tendon of extensor hallucis longus muscle |
| 26 Superficial fibular nerve (with peroneal muscles laterally reflected) | |
| 27 Peroneus brevis muscle | |
| 28 Lateral anterior malleolar artery | |



Dorsum of the right foot, superficial layer.



Dorsum of the right foot, superficial layer. The fascia of the dorsum has been removed.

- 1 Superficial fibular nerve
- 2 Superior extensor retinaculum
- 3 Lateral malleolus
- 4 Venous network of lateral malleolus and tributaries of small saphenous vein
- 5 Lateral dorsal cutaneous branch of sural nerve
- 6 Intermediate dorsal cutaneous nerve
- 7 Tendons of extensor digitorum longus muscle
- 8 Dorsal digital nerves

- 9 Tendon of tibialis anterior muscle
- 10 Saphenous nerve
- 11 Venous network of medial malleolus and tributaries of great saphenous vein
- 12 Medial malleolus
- 13 Medial dorsal cutaneous nerves
- 14 Dorsal venous arch of foot
- 15 Dorsal digital nerve (of deep fibular nerve)
- 16 Tendon of extensor hallucis longus muscle

- 17 Dorsal digital arteries
- 18 Peroneal muscles
- 19 Deep plantar branch of dorsalis pedis artery anastomosing with plantar arch
- 20 Extensor digitorum longus muscle
- 21 Extensor hallucis longus muscle
- 22 Inferior extensor retinaculum
- 23 Extensor hallucis brevis muscle



- 1 Inferior extensor retinaculum
- 2 Lateral malleolus
- 3 Lateral anterior malleolar artery
- 4 Tendons of peroneal muscles
- 5 Tendon of peroneus tertius muscle
- 6 Extensor digitorum brevis muscle
- 7 Tendons of extensor digitorum longus muscle
- 8 Dorsal metatarsal arteries
- 9 Medial malleolus
- 10 Tendon of tibialis anterior muscle
- 11 Dorsalis pedis artery
- 12 Deep fibular nerve (on dorsum of foot)
- 13 Extensor hallucis brevis muscle
- 14 Tendon of extensor hallucis longus muscle
- 15 Dorsalis pedis artery with deep plantar branch to the plantar arch
- 16 Terminal branches of deep fibular nerve
- 17 Lateral tarsal artery
- 18 Extensor digitorum brevis muscle (divided)
- 19 Arcuate artery
- 20 Dorsal interossei muscles
- 21 Deep fibular nerve

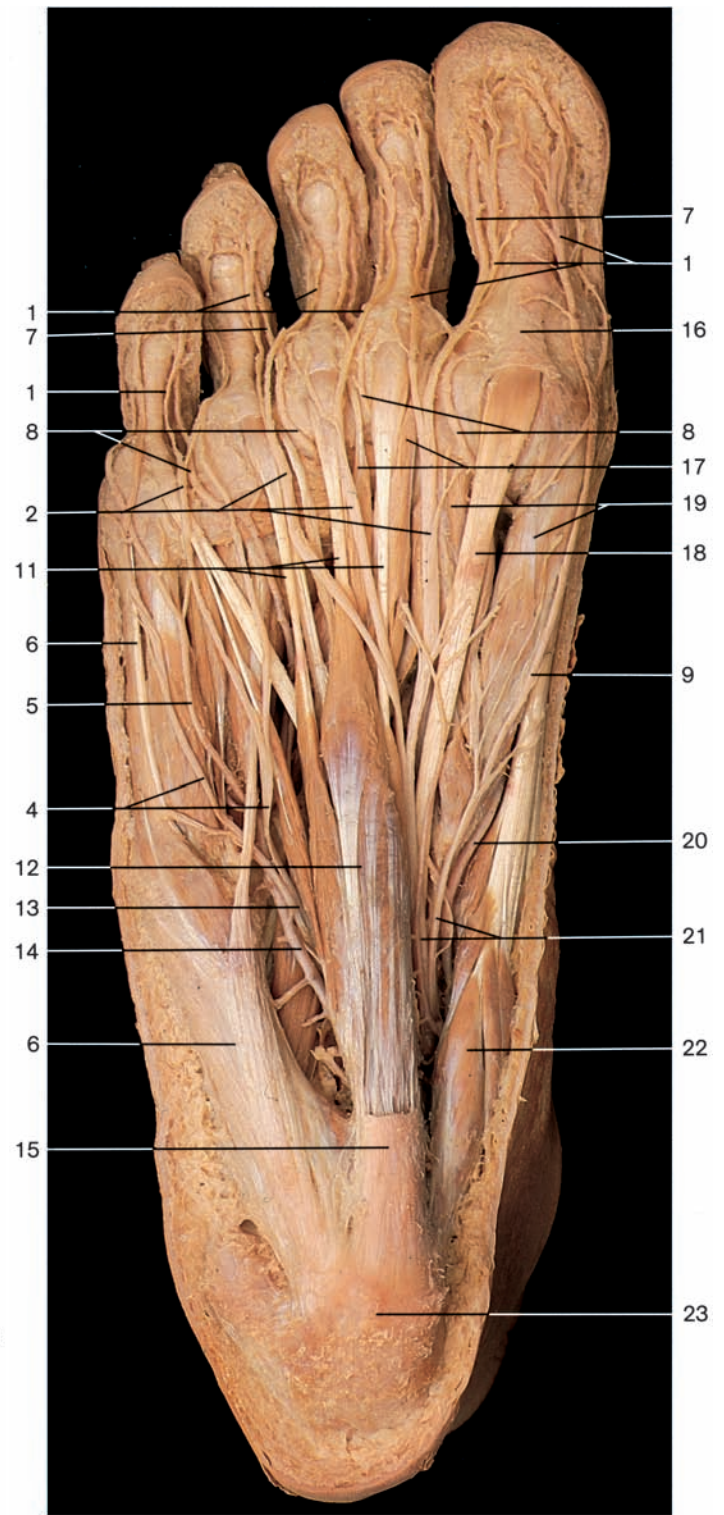
Dorsum of the right foot, middle layer. The cutaneous nerves have been removed.



Dorsum of the right foot, deep layer. Extensor digitorum and hallucis brevis muscles have been removed.



Sole of the right foot, superficial layer. Dissection of cutaneous nerves and vessels.



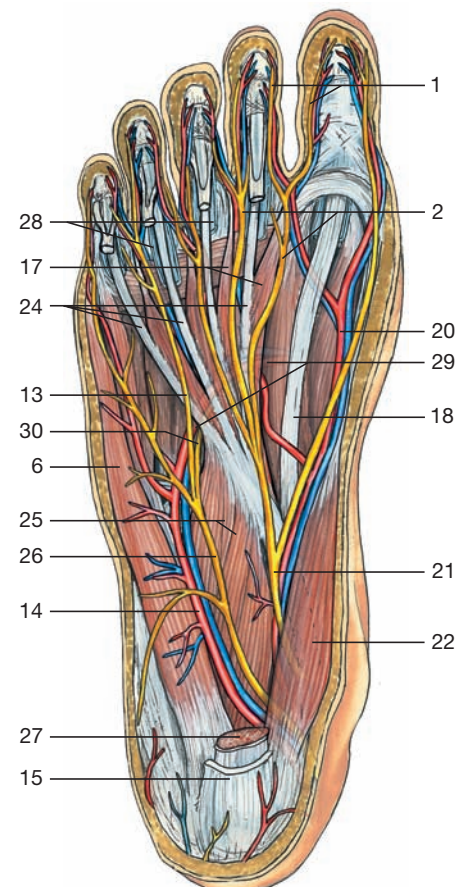
Sole of the right foot, middle layer. The plantar aponeurosis has been removed.

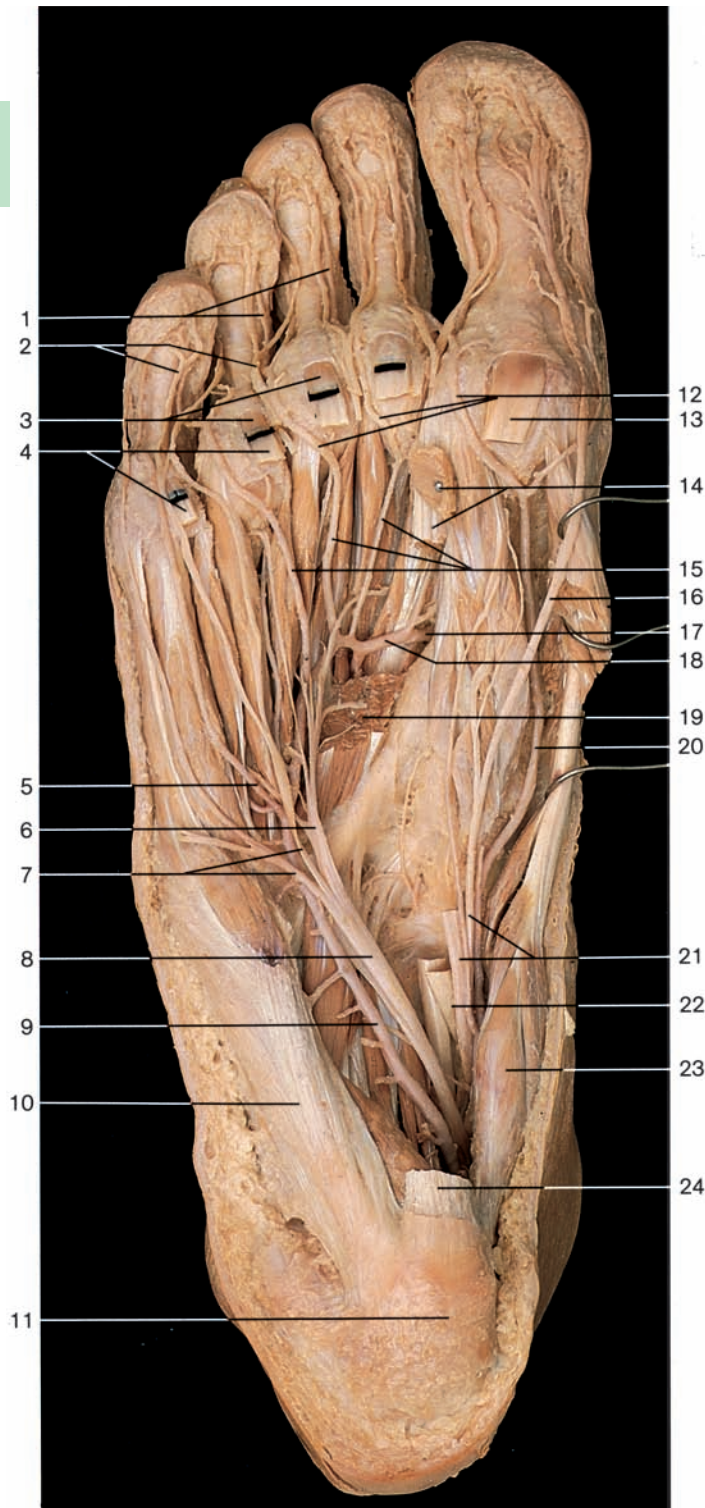


Sole of the right foot, middle layer. Dissection of vessels and nerves. The flexor digitorum brevis muscle has been divided and anteriorly reflected.

Sole of the right foot with vessels and nerves. The flexor digitorum brevis muscle has been removed. Light blue = synovial sheaths of flexor tendons.

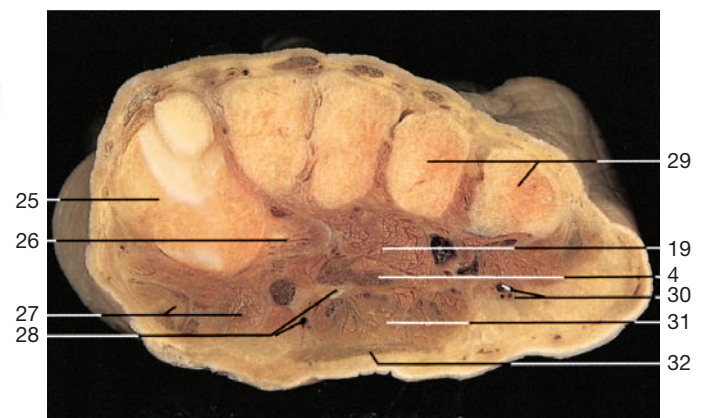
- 1 Proper plantar digital nerves
- 2 Common plantar digital nerves
- 3 Plantar aponeurosis
- 4 Superficial branch of lateral plantar nerve
- 5 Superficial branch of lateral plantar artery
- 6 Abductor digiti minimi muscle
- 7 Proper plantar digital arteries
- 8 Common plantar digital arteries
- 9 Digital branch of medial plantar nerve to great toe
- 10 Medial calcaneal branches
- 11 Tendons of flexor digitorum brevis muscle
- 12 Flexor digitorum brevis muscle
- 13 Superficial branch of lateral plantar nerve
- 14 Lateral plantar artery
- 15 Plantar aponeurosis (remnant)
- 16 Fibrous sheath of toe
- 17 Lumbrical muscles
- 18 Tendon of flexor hallucis longus muscle
- 19 Flexor hallucis brevis muscle
- 20 Medial plantar artery
- 21 Medial plantar nerve
- 22 Abductor hallucis muscle
- 23 Calcaneal tuberosity
- 24 Tendons of flexor digitorum longus muscle
- 25 Quadratus plantae muscle
- 26 Lateral plantar nerve
- 27 Flexor digitorum brevis muscle (cut)
- 28 Synovial sheaths of tendons of flexor digitorum longus and brevis muscles
- 29 Plantar arch
- 30 Deep branch of lateral plantar nerve



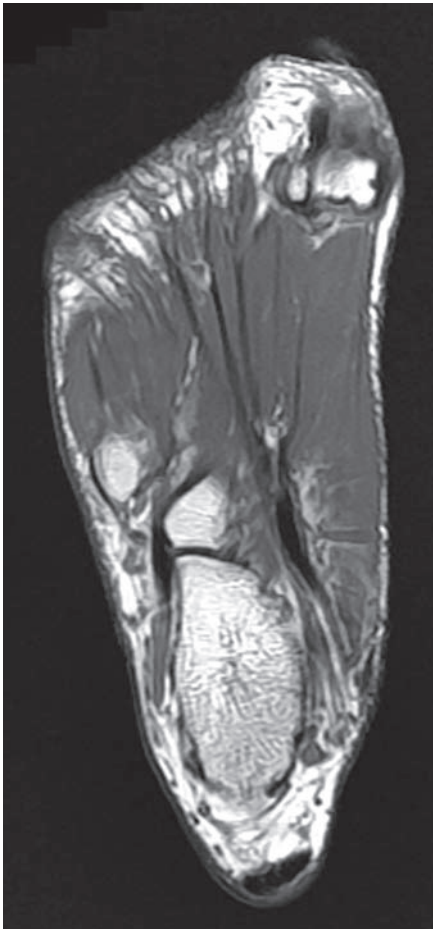


Sole of the right foot, deep layer. Dissection of vessels and nerves. The flexor digitorum brevis muscle, the quadratus plantae muscle with the tendons of the flexor digitorum longus muscle, and some branches of the medial plantar nerve have been removed. The flexor hallucis brevis and adductor hallucis muscles have been cut and portions removed to show the somewhat atypical course of the medial plantar artery and deep muscles of the foot.

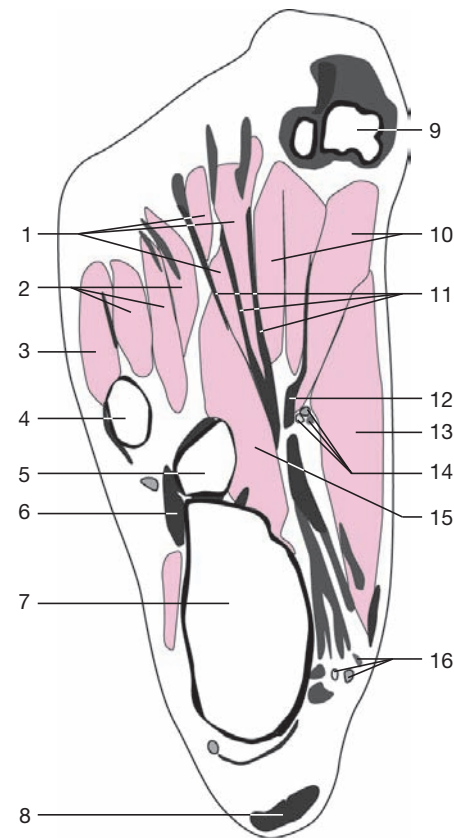
- 1 Proper plantar digital arteries
- 2 Proper plantar digital nerves
- 3 Tendons of flexor digitorum brevis muscle
- 4 Tendons of flexor digitorum longus muscle
- 5 Superficial branch of lateral plantar artery
- 6 Deep branch of lateral plantar nerve
- 7 Superficial branch of lateral plantar nerve
- 8 Lateral plantar nerve
- 9 Lateral plantar artery
- 10 Abductor digiti minimi muscle
- 11 Calcaneal tuberosity
- 12 Common plantar digital arteries
- 13 Tendon of flexor hallucis longus muscle
- 14 Insertion of both heads of adductor hallucis muscle
- 15 Plantar metatarsal arteries
- 16 Medial proper plantar digital nerve
- 17 Deep plantar branch of dorsal metatarsal artery (perforating branch)
- 18 Plantar arch
- 19 Oblique head of adductor hallucis muscle (cut)
- 20 Medial plantar artery
- 21 Medial plantar nerve
- 22 Crossing of tendons in the sole of foot (flexor hallucis longus and flexor digitorum longus muscles)
- 23 Abductor hallucis muscle
- 24 Origin of flexor hallucis brevis muscle
- 25 Medial cuneiform and first metatarsal bones
- 26 Tendon of peroneus longus muscle
- 27 Abductor hallucis and flexor hallucis brevis muscles
- 28 Medial plantar artery, vein, and nerve
- 29 Fourth and fifth metatarsal bones
- 30 Lateral plantar artery, vein, and nerve
- 31 Flexor digitorum brevis muscle
- 32 Plantar aponeurosis



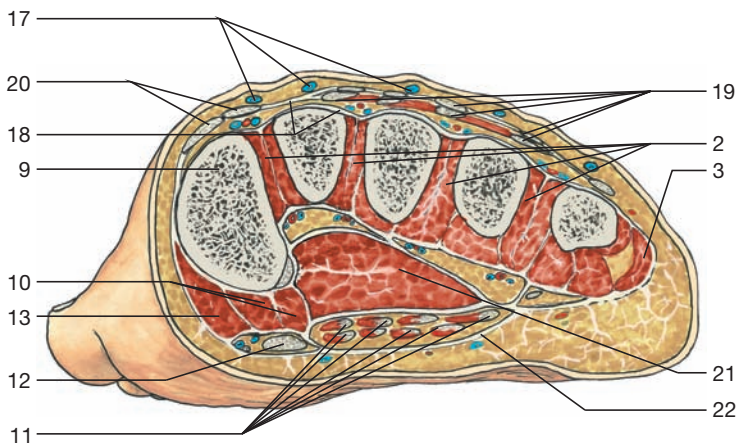
Cross section through the right foot at the level of the metatarsal bones (posterior aspect).



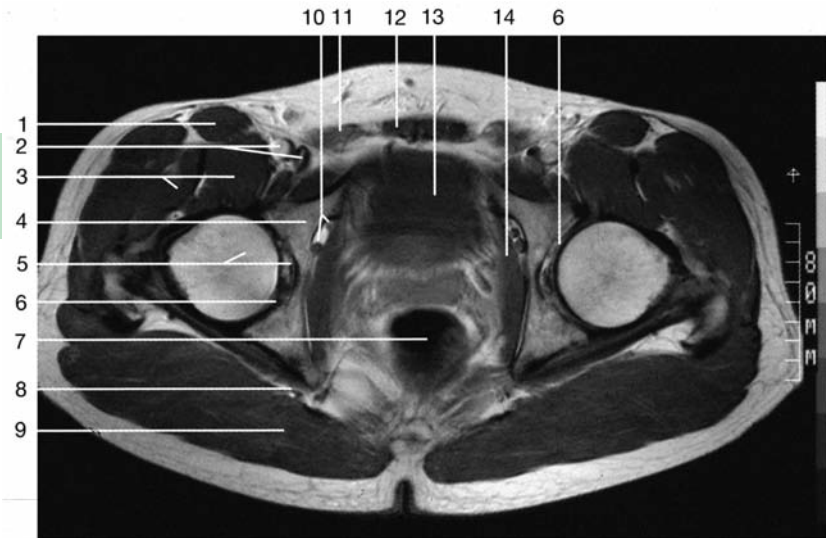
Sole of the right foot (MRI scan). (From Heuck et al., MRT-Atlas, 2009.)
For details see schematic drawing alongside.



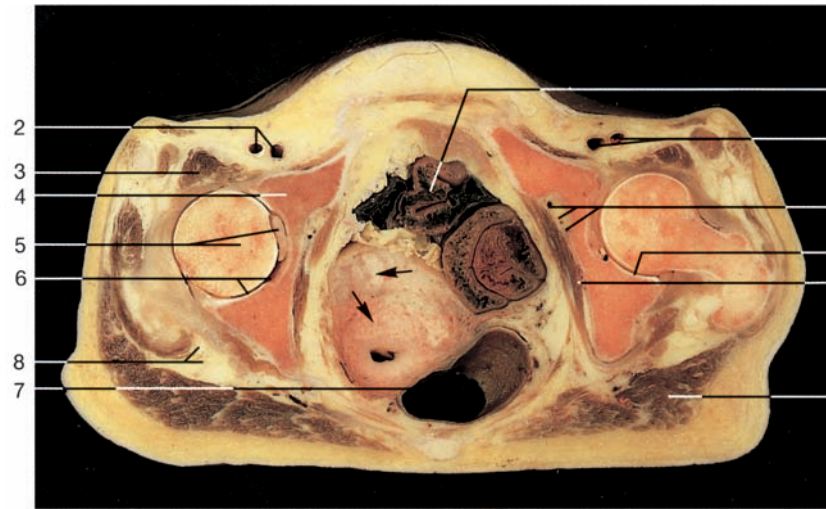
- 1 Lumbrical muscles
- 2 Plantar interossei muscles
- 3 Abductor digiti minimi muscle
- 4 Tuberosity of fifth metatarsal bone
- 5 Cuboid bone
- 6 Tendon of peroneus longus muscle
- 7 Calcaneus
- 8 Calcaneal or Achilles tendon
- 9 First metatarsal bone
- 10 Flexor hallucis brevis muscle
- 11 Tendons of flexor digitorum longus and brevis muscles
- 12 Tendon of flexor hallucis longus muscle
- 13 Abductor hallucis muscle
- 14 Medial plantar artery, vein, and nerve
- 15 Quadratus plantae muscle
- 16 Lateral plantar artery, vein, and nerve
- 17 Dorsal venous network of foot
- 18 Superficial and deep dorsal fascia of foot
- 19 Tendons of extensor digitorum longus and brevis muscles
- 20 Tendons of extensor hallucis longus and brevis muscles
- 21 Adductor hallucis muscle
- 22 Plantar aponeurosis



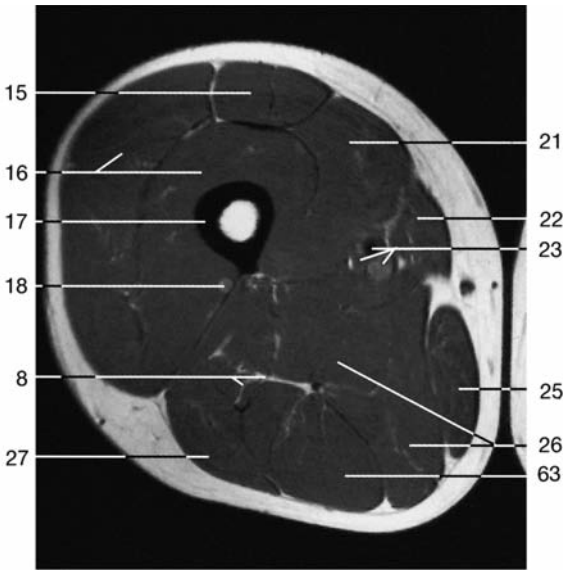
Cross section through the right foot at the level of the metatarsal bones (posterior aspect; compare with the dissection on the previous page).



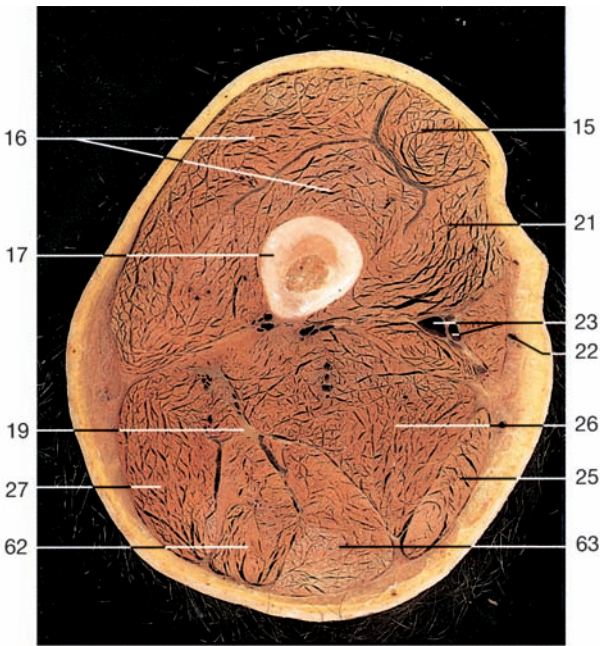
Axial section through the pelvis at the level of the hip joints. Section 1 (MRI scan, inferior aspect).



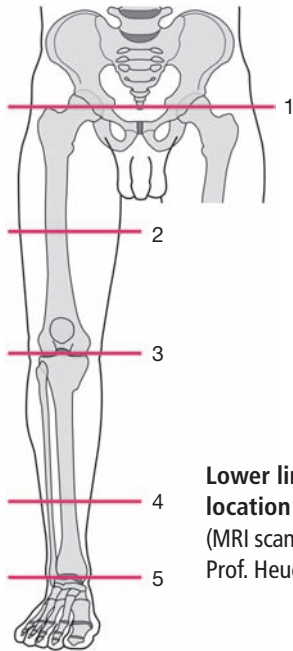
Axial section through the pelvis at the level of the hip joints in a female. Section 1 (inferior aspect). Arrows: uterus (myometrium with myoma).



Axial section through the middle of the right thigh. Section 2 (MRI scan, inferior aspect).

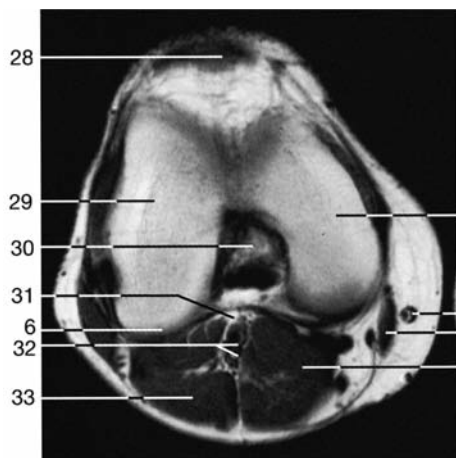


Axial section through the middle of the right thigh. Section 2 (inferior aspect).

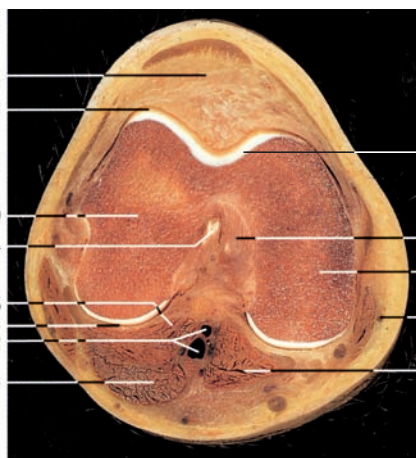


Lower limb, location of sections 1–5 (MRI scans courtesy of Prof. Heuck, Munich, Germany).

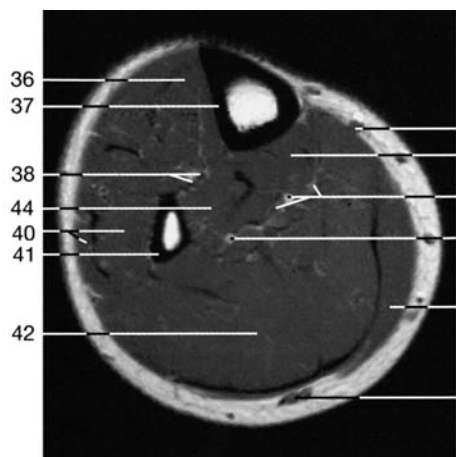
- 1 Sartorius muscle
- 2 Femoral artery and vein
- 3 Iliopsoas muscle
- 4 Pubis
- 5 Head of femur with ligament of head of femur
- 6 Articular cavity
- 7 Rectum
- 8 Sciatic nerve and accompanying artery
- 9 Gluteus maximus muscle
- 10 Obturator artery, vein, and nerve
- 11 Rectus abdominis muscle
- 12 Pyramidalis muscle
- 13 Urinary bladder
- 14 Obturator internus muscle
- 15 Rectus femoris muscle
- 16 Vastus intermedius and vastus lateralis muscles of quadriceps femoris muscle



Axial section through the right knee joint. Section 3 (MRI scan, inferior aspect).



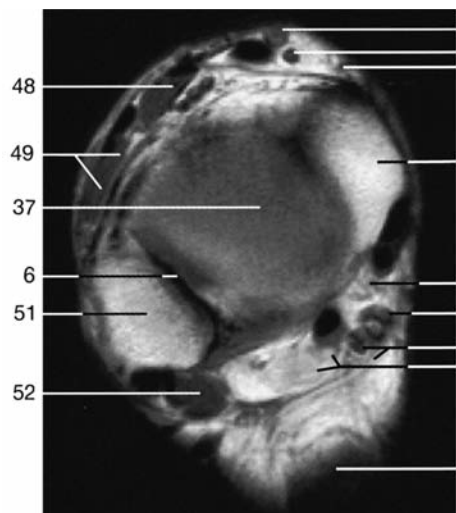
Axial section through the right knee joint. Section 3 (inferior aspect).



Axial section through the middle of the right leg. Section 4 (MRI scan, inferior aspect).



Axial section through the middle of the right leg. Section 4 (inferior aspect).



Axial section through the end of the right leg. Section 5 (MRI scan, inferior aspect).



Axial section through the end of the right leg. Section 5 (inferior aspect).

- 17 Femur
- 18 Perforating artery
- 19 Sciatic nerve
- 20 Gluteus maximus muscle (insertion)
- 21 Vastus medialis muscle
- 22 Sartorius muscle
- 23 Femoral artery and vein
- 24 Great saphenous vein
- 25 Gracilis muscle
- 26 Adductor muscles
- 27 Biceps femoris muscle
- 28 Patellar ligament
- 29 Lateral condyle of femur
- 30 Posterior cruciate ligament
- 31 Tibial nerve
- 32 Popliteal artery and vein
- 33 Lateral head of gastrocnemius muscle
- 34 Medial condyle of femur
- 35 Medial head of gastrocnemius muscle
- 36 Tibialis anterior muscle
- 37 Tibia
- 38 Deep fibular nerve, anterior tibial artery, and vein
- 39 Patellar surface
- 40 Peroneus longus and brevis muscles
- 41 Fibula
- 42 Soleus muscle
- 43 Flexor digitorum longus muscle
- 44 Tibialis posterior muscle
- 45 Posterior tibial artery and vein, and tibial nerve
- 46 Peroneal artery
- 47 Small saphenous vein and sural nerve
- 48 Extensor hallucis longus muscle
- 49 Extensor digitorum longus muscle
- 50 Tendon of peroneus longus muscle
- 51 Lateral malleolus of fibula
- 52 Peroneus brevis muscle
- 53 Tendon of tibialis anterior muscle
- 54 Dorsalis pedis artery
- 55 Medial malleolus of tibia
- 56 Tendon of tibialis posterior muscle
- 57 Tendon of flexor digitorum longus muscle with synovial sheath
- 58 Flexor hallucis longus muscle
- 59 Posterior tibial artery and vein
- 60 Lateral and medial plantar nerves
- 61 Calcaneal or Achilles tendon
- 62 Semitendinosus muscle
- 63 Semimembranosus muscle
- 64 Anterior cruciate ligament
- 65 Plantaris muscle
- 66 Small intestine

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